Transcript for Video Clip 4.1

Teacher/video ID:	Anne Dieken, 4.1_stella_WC_dieken_c1
Content area:	Water cycle
STeLLA strategy:	Engage students in using and applying new science ideas in a variety of ways and contexts (STL strategy 6).
Context:	In this series on the water cycle, students have previously studied how changes in heat energy affect water molecules to cause evaporation and condensation. In this video clip, the teacher introduces the class to a set of scenarios. For each scenario, she wants students to explain what is happening. The focus question is, *How does water appear and disappear?*

Video Clip 1a

Time Code	Speaker	Discussion
0:00:03	T	Uh, OK. So this afternoon we're going to explore this question: *How does water appear and disappear?*
0:00:09	T	And what we're doing is— At each table you're going to work as a group to figure out why and how water seems to appear,
0:00:18	T	and how it seems to disappear.
0:00:19	T	So, table 1, you've got two glasses of water. One is day 1, and one is day 10.
0:00:25	T	Now theoretically they both started out with the same amount of water. But by day 10, you only have half the water left in there.
0:00:33	T	What happened to the water? Shh. Mm-mm, think about it. You're going to be writing it down. Table 2, you've got water in a cup,
0:00:40	T	but it's sealed in a plastic bag. And this has been in the sun for two days.
0:00:44	T	So you're going to have to imagine, because we were away on the weekend.
0:00:47	T	You're going to have to imagine what's happening with the, um, cup of water, um,
0:00:52	T	inside the sealed plastic bag.
0:00:55	T	Table 3 has a cold water bottle. And if you have a cold water bottle on the table—
0:01:02	T	let's say it's summertime—what do you normally see on the water bottle after, you know, half an hour or 10 minutes sometimes.
0:01:08	T	What happens? Aleah.
0:01:09	SN	Um, well, if it's hot, then it will kind of evaporate?
0:01:14	T	What would evaporate?
0:01:16	S	The water molecules.
0:01:17	T	Oh, OK, um, but what do you normally see on the water bottle? Yeah.
0:01:21	SN	You see, um, water or frost on the outside of the … the bottle.
0:01:25	T	OK. So you're going to look at … so water seems to appear on the side of the … of the bottle.
0:01:30	T	So you're going to have to explain why that happens. It may or may not happen today. So … but you've seen that happen before.

0:01:38	T	So we're going to explain why that happens. Table 4 has … is a similar situation. But you've got a cold can of soda.
0:01:47	T	And what normally happens when you have a cold can of soda sitting on a table? Chris.
0:01:51	SN	Sometimes it stays in the— There's no water dripping out.
0:01:55	T	OK.
0:01:56	S	So it just stays out.
0:01:59	T	OK. What else could happen to, um, to the, um, can of soda? Yes, Andrew.
0:02:04	SN	It creates condensation.
0:02:06	T	OK, so you're going to have to explain to me what that is. So you guys have that scenario. Now, with this group—
0:02:12	T	Please don't touch this, because it's hot. It should be. Well, let me touch it for you. OK, uh, this water has been heating.
0:02:21	T	But what's going to happen after I … after this has been sitting on this hot plate? That's quite hot.
0:02:27	T	What's going to happen to the water in this teakettle? John?
0:02:29	SN	It's probably going to start, uh, like steaming up.
0:02:32	T	OK.
0:02:33	S	Like, it's going to start boiling.
0:02:34	T	OK. So you're going to have to tell me what's happening to the water in the teakettle. OK?

Video Clip 1b

Time Code	Speaker	Discussion
0:19:58	T	I want you to explain now what's happening with your scenarios in terms of evaporation, condensation,
0:20:07	T	and what water molecules are doing. OK?
0:20:11	T	And you have 12 minutes. So you need to explain what are the water molecules doing? Are they really appearing and disappearing?
0:20:20	SN	They just … they just—
0:20:21	T	And is it getting warmer? Or is it getting colder?
0:20:24	SN	Well, the main … two main things [inaudible]—
0:20:30	T	Actually, I want it … Guys, I want a different recorder this time. Different recorder.
0:20:36	SN	I just … I'm just asking … My idea from last time was never got … got written down.
0:20:39	T	Never got written down? Write it down really quick. You can be the next recorder. But that means you guys need to be more, uh,
0:20:47	T	need to participate more. Good answer, by the way.
0:20:51	T	All right. Who's my new recorder over here?
0:20:54	SN	We're just [inaudible]—
0:20:55	T	Someone who can write big.

0:20:56	SN	I can.
0:20:57	T	OK. You're going to write? OK. All right, guys, so do we need to change much from your explanation from before?
0:21:03	SN	No.
0:21:04	T	Not much, except that …
0:21:06	SN	We just need to add something.
0:21:08	SN	Yeah, air—
0:21:10	T	Yeah, because we talked … because you said that condensation is hot air and cold air mixing. OK? Um, well, condensation is really what?
0:21:18	SN	It's cold air—
0:21:19	T	It's … it's air. Well, it used to be warm. So you were really close. You've got—
0:21:22	SN	Oh, so water turned into cold air.
0:21:25	T	Well, yeah. What … how does that happen?
0:21:27	S	Um …
0:21:29	T	How does hot air generally become cold? Yeah.
0:21:31	SN	Um … um, well, I don't know. Hot air … yeah, they're—
0:21:40	T	OK.
0:21:41	S	We need to [inaudible] what he said. When [it] turns cold, it comes [inaudible] …
0:21:44	T	And how does it normally turn cold? Think about it. If you're coming from a hot situation, like from the desert to somewhere else,
0:21:50	T	when does it get cold?
0:21:51	SN	Here in the morning.
0:21:52	SN	When the water turns into [cold air].
0:21:53	T	OK.
0:21:54	SN	Wow.
0:21:55	SN	Also, it may happen when the weather is, like, it gets hot or cold.
0:22:01	T	OK. So when does that happen? When does the water … weather turn hot and then cold?
0:22:06	T	Did— Dallon, I want someone else to write this time.
0:22:08	T	Who has nice handwriting that can write? All right, Drew. But big, though, OK, Drew? So we can see.
0:22:14	SN	Um …
0:22:15	T	Yeah, hon.
0:22:16	S	[Inaudible] Oh, I forgot.
0:22:18	T	Oh, come on.
0:22:19	S	But the water vapor …
0:22:21	T	OK.
0:22:22	S	Is, like, um, say how we can't see air.
0:22:25	T	OK.

0:22:26	S	And same with oxygen … How we breathe it in.
0:22:28	T	Mm-hm.
0:22:29	S	But we can't see it.
0:22:30	T	That's right.
0:22:31	S	So it's like water vapor. You can't see it.
0:22:32	T	OK. But when do you eventually see water vapor?
0:22:36	S	When it's really cold.
0:22:37	T	And how come?
0:22:38	S	Because you can see your own breath.
0:22:41	T	Ah. So you're able to see your own breath. Why?
0:22:46	S	I don't know.
0:22:47	T	OK. You're getting there. Yeah.
0:22:49	SN	Um, you could see your own breath because, like, heat in your breath will affect the cold air.
0:22:56	T	OK.
0:22:57	S	And, like, maybe when the, um, warm molecules meet the cold molecules, you can see it. It's visible.
0:23:07	T	All right. So we're talking about water molecules. Where do you think you see—Where do you think the water molecules are around this can?
0:23:13	SN	Floating.
0:23:14	T	They're floating, right? Because you can't see them. So they're around here somewhere.
0:23:17	T	So when do you think you start seeing water droplets on the can?
0:23:21	SN	Like, when you … when it's a really hot day.
0:23:24	T	OK.
0:23:25	S	Not like today, when it's winter and it's cold.
0:23:26	T	All right. Then how come? How come you can see it on the can on a hot day and not when it's a cold day like today?
0:23:30	S	Because it will start to, like, sweat—
0:23:33	T	Complete sentences.
0:23:35	S	It will … you'll see the water on a hot day unlike a cold day because it [the can] will start to sweat …
0:23:42	S	sweat a little.
0:23:43	T	OK.
0:23:44	S	It's, like, sweating because it's giving off the bad water or salt in your body.
0:23:50	T	So, OK. So we're talking about sweating in the body. But is that the same thing that's happening with the can? Is it giving off salt?
0:23:58	T	Is it sweating? When you said, "It's, like, sweating—"
0:24:00	S	It's, like, sweating.
0:24:01	T	OK, because it's starting to get wet actually.

0:24:06	SN	Mrs. Dieken?
0:24:07	T	Yeah, hon?
0:24:08	SN	How does the hot air turn into the cold air?
0:24:10	T	OK. I … Look at this can. If you're looking [for] the air, right? Here's the air around the can.
0:24:18	T	Where do you have hot air in relationship to this can? And where do you think the cold air would be?
0:24:23	SN	On the can?
0:24:24	T	OK. So if you've got … If you're a water molecule, pick a place where a water molecule could be.
0:24:28	S	Right there.
0:24:29	T	Does a water molecule have to be touching the can … the glass?
0:24:32	SS	No.
0:24:33	T	Where could it have started from?
0:24:34	SN	[Inaudible]
0:24:35	T	OK, so what … what … Tell me where the water molecule would be traveling from if it goes from … from a vapor to a … to a liquid.
0:24:42	SN	It would hit this and turn into [air].
0:24:44	T	OK. How come?
0:24:45	SS	Because the can is cold.
0:24:46	T	OK. So if it's cold, what happens to the water molecules?
0:24:49	SN	It turns into water.
0:24:50	T	How come?
0:24:51	SN	Because they just come a little closer to the … together.
0:24:53	T	Ah. So it's not just the one water molecule that gets cold by itself and becomes water vapor, uh, becomes liquid water.
0:25:00	SN	It's—
0:25:01	T	But …
0:25:02	SN	But more molecules are coming, so it turns into water.
0:25:05	T	OK. So … so each of you has a water molecule, and it's coming around here. And it's flying around. And what's happening to it?
0:25:13	T	OK, now it's cool here. What's happened to your water … to your water molecules that are water vapor right now?
0:25:18	T	And they're doing this. OK?
0:25:19	SS	They're—
0:25:20	T	Now, this is one water molecule. This is one water molecule. This is one water molecule. How are they going to become liquid water?
0:25:25	SN	If they all form together.
0:25:26	T	What do they have to do? They all have to form together. I need you to write that down.
0:25:29	S	OK.

0:25:30	SN	Sure.
0:25:31	SN	All water molecules have to form together.