



## Presentation

FULL DETAILS AND TRANSCRIPT

### In Front of the Class: Students' Whiteboard Explanations

Perrysburg High School, Ohio • May 2008

Topic: How to Organize Your Teaching

Practice: Higher-Order Questions

#### Highlights

- Teacher Nate Ash uses whiteboard presentations in his physics class to give his students a forum for explaining their problem solving.
- The teacher plays a key role in setting up authentic opportunities for students to explain their thinking.
- When students have the opportunity to present their thinking to their peers, they can identify gaps in their knowledge and develop their understanding further.
- Whiteboard presentations provide the opportunity for students to act as teachers by questioning their peers; this helps them to become critical thinkers.

#### About the Site

Perrysburg High School

Findlay, Ohio

## Demographics

90% White

2% African American

3% Asian

3% Hispanic

2% Multiracial

5% Free or Reduced-price Lunch

9% Special Education/Disabled

High School Physics teacher Nate Ash has his students do whiteboard presentations to present their lab findings or problem solutions to their classmates. After doing a lab activity, students prepare their whiteboards in groups, present their findings to the class, and answer questions posed by their peers. Whiteboard presentations are an effective way to help students explain and deepen their thinking by:

- Making students' thinking public, clear, and visible
- Providing opportunities to share explanations with peers
- Helping students to get feedback on their explanations and locate gaps in their knowledge or understanding
- Giving students opportunities to ask their own questions and challenge their classmates' explanations

## Full Transcript

### Slide #1

Welcome to "In Front of the Class: Students' White Board Explanations."

### Slide #2

I'm Nate Ash. I am a physics teacher at Perrysburg High School for grades 11 and 12 in Perrysburg, Ohio. What we are trying to do with this lab is take a look at how electricity travels through space from one region to another region—or one area to another area—to get a clear picture of how this works in our head.

### Slide #3

What the students are doing is they are looking at different shapes and the electricity between those shapes, and they are using a measuring device, a probe, to measure the electricity between those regions

of space. And so, they are actually looking at what that electricity looks like, the field lines anyway, what those field lines look like between those shapes.

#### Slide #4

Some of the higher-order questions that I am asking along with this lab are: How do you know—when you are doing this experiment, how do you know where to draw the electric field lines? How do you know where the electricity is going and how do you know what shape that this is taking?

#### Slide #5

I would also ask some questions about: How do you know where the electricity, or what we call “potential,” how do you know that’s increasing? Where are those regions, and how do you know those regions are located at that spot? And so, they are finding places where the voltage is the same or the electricity is the same. And once they have that, then they can start drawing in field lines, which is what they will be presenting to the whole class.

#### Slide #6

And so I circulate around while they are drawing these pictures. And to myself, I start to note questions that I can ask about particular whiteboards. And then I also make a note of who I want to bring up and when I want to bring them up in front of the classroom to make presentations.

#### Slide #7

While they are preparing whiteboards, I go around, and I start to prep them for what questions I might ask them during the presentations. And so some of the weaker students already have an idea of what I am going to ask them, so if they feel successful, they start to participate, and they start to pay attention. They start to understand better.

#### Slide #8

And so that’s one of the ways that you get these students ready to give these presentations and not only to give the presentation, but also receive the presentations while other people are presenting, what’s important, how do I question them, those kinds of things.

Slide #9

So what I am having the students do when they prepare their whiteboards is—first of all—using a picture, represent the lab data that they collected, and so they are actually going to draw a picture very similar to the apparatus that they used. And in their pictures, they are to draw the electric field lines and the little dots of voltages, so where all the one volts are, all the two volts are. And so, they are actually drawing those pictures.

Slide #10

And so when they get up in front of the classrooms, that's when I will have them start to explain their picture. And they are basically thinking on the fly because they really have to get at the point where they understand the concept or else they won't be able to answer the questions.

Slide #11

So the audience needs to be actively engaged as well because I will let things go, and they need to be paying attention. They need to question the presenters as well. And so they become responsible for their own education, for their own understanding of what is going on with the concept. The one thing that you cannot do is you cannot allow one or two students to never answer any questions. Everybody who is up there needs to be responsible for what they put on the board. And a lot of times in group work, one or two people dominate and one or two people sit back; you can't allow that to happen.

Slide #12

So we would ask them in some steering sort of questions; What would happen if you put a charge there? Which way would the force be going? Does that agree with what your whiteboard suggests about the field lines? Some of the other questions that I would ask would be: How is this similar to the gravitational field? How is this similar to what we have already learned? Are there any differences, and what are those differences? So students are forced to think about not only what we are dealing with at the moment, but relate it to what we've already learned and what we've already talked about.

Slide #13

Whiteboarding allows me to ask one more question further than maybe a quiz or test. I can ask them why or how do you know this? How do you understand this to be true? So I can really probe for their understanding

maybe in a better way, a more complete way than a lot of the other forms of assessment.

#### Slide #14

And so, when the students start asking questions to other students, this is something that they really enjoy. They really enjoy putting each other on the spot and making each other accountable for what they know and how they explain it. And so, they like to ask those probing questions and both people, the presenters, they love to show off what they know and the people who are asking questions, they take great pride in coming up with the best question of the class.

#### Slide #15

So how do you get students ready to answer these kinds of questions or use the whiteboards and present this information to you? Very early in the year, I mean the first day, they are broken up into groups and I have them write things on the whiteboards, and they have to present the very first day things like what their interests are, what food they like, what their favorite movie is, just very simple things, questions that they can answer.

#### Slide #16

And we—just everyday for about the first three weeks, everybody is up in front of the room, and everybody has to answer at least one question. And they start to become comfortable with and familiar with the process. And they start to like it. They start to appreciate it. Then they start understanding the game that you are playing. And the whole purpose behind whiteboarding is for them to bring out their own understanding and for them to explain what's going on. Instead of me giving lecture notes or me standing up there with a PowerPoint slide, they are the ones that are driving the class.

#### Slide #17

And they also know that if they say something incorrectly, there are times when I would let that go through to see if people catch it. So they know that they have to be awake in the audience as well. They know that they are actively participating in the education.

#### Slide #18

The one thing that whiteboarding does—especially the presentations—that's different than anything else is

that they have to defend what they understand and what they know in front of an audience. They have to be able to think on the fly. They become critical thinkers because none of the questions that I ask them can they study for. So they are up there pretty much unguarded, and they are able to fend off a lot of these questions that I am asking them.

Slide #19

And it's pretty rewarding for the students, and it's pretty rewarding for me. But I think it makes them a better overall student, and I am confident that it makes them better at the curriculum that I am teaching. I mean test scores that I have over the last four or five years since I have been doing this are much higher than what I had when I would just go up to the board and solve problems and do problems and go through samples. So, not only are they getting the curriculum, they are becoming critical thinkers. They are getting used to presenting in front of people. And these are lifelong skills that will prove very beneficial to them.

Slide #20

To learn more about higher-order questions, please explore the additional resources on the Doing What Works website.