

COMPILATION: Whiteboarding is a tool, a learning experience, a path plotted by a professional

Date: Thu, 25 Jul 2002
From: Jane Jackson <jane.jackson@ASU.EDU>
Subject: whiteboarding: wisdom from Don Yost

[Below is a recent paper by Don Yost. It's well worth saving and putting into your modeling manual. Don has been modeling for over a decade; he learned Modeling Instruction from Malcolm Wells. He has led Leadership Modeling Workshops and has taught whiteboarding to thousands of California teachers at all levels.

Don is here at ASU now, developing model-based earth science materials. We were talking about whiteboarding one day, and I heard him say that, in his whiteboarding, he doesn't have a group of students come to the front of the room; rather, **he has all the students sit on top of their lab tables to form a sort of circle or square - because the tables aren't movable.** He's in the background. I said to him, "this sounds like circle whiteboarding to me." I mention this because some modelers have told me that they can't do circle whiteboarding because their tables can't be moved out of the way. Sounds like this is a solution. - Jane J.]

WHITEBOARDING: a tool; a learning experience; a path plotted by a professional.

(contributed by Don Yost)

I have grown concerned lately when reading comments about whiteboarding (not board meetings). I fear that I have inadvertently contributed to some misconceptions about whiteboarding. During training, we stress audience participation during white board sessions. The purpose for this is to provide practice for a group of professionals who will be using this technique later in their own classrooms, and the best way to learn to do something is to do it. The situation is artificial because the audience is made of teachers skilled in the content material needing to hone questioning skills, not novice content learners, as are your classes. The impression we instructors gave, unfortunately, was that the whiteboarding should be mainly student driven. This is unfortunate, because *in attempting to make the WB sessions student centered, you lose much of its power and bring in irrelevant issues such as grading the white boards.* The conditions under which you learned whiteboarding are necessarily artificial and should not resemble your classroom whiteboarding. The two have entirely different goals: learning a skill vs. learning content.

The power of whiteboarding lies in its ability to allow the instructor to follow the learning process as it is happening, and to control that learning process in a way that optimizes learning. Whiteboarding should not become a report about the learning process to be scrutinized and evaluated by a group of peers. It is a process designed to let the professional guide and evaluate the learning process as it takes place. This is what makes grading a white board irrelevant. If you are teaching a skill like driving, you do not grade the student as he is learning: how well did he make the first right turn he ever made? how well did he stop for the first time? how well did he start the car for the first time? You grade the student after he has learned and then you do it by having them demonstrate that skill in a totally different environment than the learning environment. Certainly, you can assess the student's progress, but not for the purpose of evaluation, but for the purpose of designing further learning activities.

The whiteboarding process should be as free from stress as possible, for the same reason that learning should be a reduced stress environment. Learning is more effective when mistakes are accepted as part of the process of learning. This means that *instead of standing in front of the group, a round table presentation showing everyone's work together is preferred.* It means that *mistakes should be correctable during the process;* no one should have to parade their mistakes to the group after they realize that they are mistakes.

If done correctly, whiteboarding is an exhausting process for the teacher leaving no time for evaluating the art work. **You must interpret exactly what the student is saying, and understand the alternate concepts so well that you can anticipate any direction he may be going so that you can construct a question which will direct his learning.** This process of listening, interpreting, and constructing a strategy all at the same time is a highly demanding skill for the teacher. (The questioning about the solar system from the last part of the "Private Universe" provides an excellent example of this process).

Whiteboarding is a teacher tool, and should be used by the teacher. I do not mean to imply that the audience should not be involved, just to stress that **the questions asked during a WB session are not the type of questions a novice learner will normally employ.** *The skillful teacher will often reflect questions back to the audience: do you agree with what was said? How would you phrase that? What do you think he meant by that?*

Sometimes a discussion catches and the students will take off with it. This is a time to step back and let them wrestle the truth out. These interactions will happen on their own and when they do, they are rich beyond anything you could create. The point is that you cannot create them. They happen or not, and the wise teacher knows enough to back off and let them happen.

The point, then, is that whiteboarding is a tool. It is a learning experience, not a final report. It is a free exchange of ideas, not a critique. It is a path plotted by a professional; you, not a free running discourse dominated by other novice learners (unless you get lucky).

Date: Thu, 25 Jul 2002
From: Don Yost <DoYost@AOL.COM>

Tim Burgess wrote:

< What if
students "own" the process of learning?
students learn to ask good questions through practice?
students talk more than the instructor and are called to task by peers who listen and think
when other students speak?
students demand "how a group knows"?
the students come to conclusions based on sound reasoning and verify with empirical
evidence, but the teacher never says that conclusion explicitly? >

I agree with all of that totally.

Tim wrote also:

< My job is to help my students learn to ask the best questions they can. It is no different than basketball. Do students learn to shoot a basketball well by watching me repeatedly shoot one? I think they need to shoot. They need to shoot repeatedly and with reflection. I may comment, I may help SOMETIMES, but they need to be shooting. Just as they need to be questioning. >

I totally agree here also. My point, to use the basketball analogy: My goal is to be sure the students are tossing toward the hoop. If I give them a ball and having never seen a basketball game, ask them to play, I will want to play an active enough role so that if they all have decided that tossing the ball in the garbage can is correct, I can aim them at a more productive direction. I do not deny, nor did I deny in the paper, the value of student participation. I do not deny the value of students owning their learning. What I do believe is that **the teacher is in the best position to assure that the learning process is going in the correct direction and that**

comments made by the students are actually understood by the students. It is very easy for students to give the "correct" answer, but have the wrong ideas. This is where the teacher's job becomes critical.

Date: Thu, 25 Jul 2002

From: Gregory Groeschl <ggroeschl@MTSD.K12.WI.US>

I agree with Tim (with all due respect, Don).

The best whiteboard sessions (IMHO) are when students ask students - isn't this the art of classroom dialogue DH talks about - finding ways to get students to discuss science like scientists?

I agree with Don that there are times when the instructor must step in and ask the questions that need to be asked - but if this is the central mode of WB presentations, it seems little different from standing in front of the class and asking questions of them ala lecture dialogue.

When I went through the program back in 97-98, I remember Dave Braunschweig and Rex Rice extolling the virtues of getting students to be able to ask the questions that need to be asked, the instructor stepping in only if needed. *They also showed us ways to get students to ask the questions - by planting questions while students are making boards, having a group do a "wrong" solution on purpose (use once a semester), etc.*

I have been fortunate to "hang" with Modelers trained at various stages at various places around the country. One of the discrepancies I have seen in the training is to what extent student roles as questioners is addressed. I firmly believe that **this where the art lies - getting students to be the primary questioners, but stepping in as needed.**

Also, I once did some action research on this topic - Does teaching students how to ask questions in WB make a difference in their learning? It was a while ago, and I threw out the paper, but I recall that the Ed people who study things like meta-knowledge, etc. think that there is a link to the level of questions students ASK (ala Bloom' taxonomy) to the level of student ABILITY. My thought was that **by teaching students to ASK higher level questions they think higher level thoughts**, thus become higher level physics students. I never found data (outside my room) that backed this claim up - it seems a tough thing to control and measure. I have no references for this, but look up questioning and such on a search. I believe there is a connection.

Date: Thu, 25 Jul 2002

From: stan hutto <fizwiz2@YAHOO.COM>

Hello to all,

Since Jane posted my comments about "whiteboarding" in the compilation, I feel I can jump in on this strand. As I said in my post way back that I tend to move toward more "in-the-round" meetings as the semester progresses, so I guess I side more with Don's comments. I wholeheartedly agree that **we as teachers/facilitators need to use our judgement and gently direct/"coerce" the sessions and questions in the proper directions as needed.** That is obviously where the skill comes in and it is something that I work at improving every year (recalling Dr. Dave's comments about the Erickson article on mastery of subject).

As to Greg's recent posting. I remember in my formative school years, as students we learned how to write essays IN PART by emulating the styles of great essayist from the "English canon", dipping our pens into the ink well or scratching it out our black slates. So, like Greg I have no solid data, but I think there is real merit in the concept that by helping to lead the students to asking higher-level questions - we stimulate them to higher-level thinking. They learn to look deeper into the problem/situation. Just as my sophomore English teacher would implore us lowly amoebic forms of life to go deeper than just superficial reading of a story/poem/essay. **Once the students have been guided gently along the way to deeper scientific discourse they will then continue the practice** and reap the rewards. Kind of like when Dad ran along beside the bike aiding you while you pedaled feverishly and finally let you loose. What a joy that was to suddenly have a whole new world of discovery and adventure to open.

Date: Fri, 26 Jul 2002

From: "Kathleen A. Harper" <harper.217@OSU.EDU>

Greg G. said:

>Also, I once did some action research on this topic - Does teaching students how to ask questions in WB make a difference in their learning? ... My thought was that by teaching students to ASK higher level questions they think higher level thoughts, thus become higher level physics students. I believe there is a connection.>

Well, not exactly the same thing, but Eugenia Etkina and I analyzed questions that students asked in structured weekly journals to clarify their own understanding. We found a lot of neat stuff, but among other things, we saw that **students who asked higher-level questions had high MBT scores at the end of the quarter**. We have hypothesized exactly what you say, that training the students to ask higher-level questions might help them achieve more, but haven't done that piece of the research yet. (Hopefully the first bit will be accepted by the reviewers soon.)

Date: Sun, 28 Jul 2002
From: Don Yost <DoYost@AOL.COM>

There are many concepts in physics which are generally not understood correctly. (see taxonomy of misconceptions from the article in *The Physics Teacher* by Wells, Swackhamer, and Dave.) Consider "bridging" as discussed by Camp and Clements. **There are some concepts which are so slippery that they take master questioning to work through. No student is prepared to run that sort of questioning. This is a job for a professional, and that's the teacher.**

Read carefully and you will see that I encourage student questioning. However, I am the one trained to realize when that is appropriate and when it is going in a productive direction. I am the one with the tools to make the bridges from known to unknown concepts.