

A TIME for Physics First

ACADEMY FOR TEACHERS
INQUIRY AND MODELING EXPERIENCES FOR PHYSICS FIRST

Leadership in Freshman Physics, 2009-14



A TIME for PHYSICS FIRST

NEWSLETTER: Vol 4, No. 3, December 2010

MAKING WHITEBOARDING SUCCESSFUL

Matt Stacey, Jefferson City Public Schools

Whiteboarding has become an integral part of many of our classrooms. Of course, it comes with some growing pains. It's not only new to students, it is also new to many teachers. Being that we are educators, we are always looking for ways to improve the classroom environment. Here are some thoughts to help make whiteboarding more successful in your classroom.

#1 CREATE WHITEBOARDING EXPECTATIONS

Our department decided to create a whiteboarding expectation list for our students. Strictly enforce these. Eventually the expectations will become habit. It may also be interesting for the students to create their own expectations for whiteboarding. Many times when students feel they have invested ownership into something they are more likely to buy into the product. Some classes can become so invested in whiteboarding it can be done with substitute teachers. The kids will actually know how to run the class. Just make sure you give the sub an answer key!

#2 IT'S OKAY TO BE WRONG!

Just recently our department was asked to do a presentation to our school at a staff meeting on whiteboarding. We decided to give the students a survey on the "likes" and "dislikes" about whiteboarding and share them with our staff. By far, the #1 dislike from our students is the fear of being wrong. It must be made clear that we expect mistakes to happen. I constantly tell our students I love their mistakes. We learn from mistakes. Mistakes force us to figure out why were wrong. This is something that must be constantly reinforced. When the kids are working the questions before they present, they love to ask the teacher whether their answer is right or wrong. Simply reply, "Well, I guess we're going to find out, aren't we."

TABLE OF CONTENTS

Making Whiteboarding Successful	1
Whiteboarding Q & A	2
Presentations and Publications 2010.....	4
Whiteboarding Options	4
Physics First 2010.....	5
Absenteeism in the Classroom	6
Physics is Fun	6
Student Absences	7
Differentiated Instruction	8
Successes and Challenges.....	9
Brain Benders	11

#3 WHITEBOARD IN PAIRS

One of the other bigger dislikes was standing in front of the room. If students are with a partner it relieves student anxiety. Pairs also prevent students from "hiding" in larger groups of three or four.

#4 HAVE MULTIPLE GROUPS WHITEBOARD THE SAME QUESTION

Compare and contrast is a powerful tool. It also expands on the variety of answers. Students will find different ways of finding the correct answer. It also gives us a better perspective of why a group may have a wrong answer. This is especially valuable when analyzing graphs and motion diagrams.

#5 KNOW YOUR STUDENTS!

Not every student can answer the highest level questions on the DOK list, but all of our students can answer the simple questions. This is a great way to help the struggling student relieve their anxiety while standing in front of the class. Johnny may not be able to calculate the instantaneous velocity at 4 sec. from an x-t graph, but he may be able to tell the instructor that the slope has a positive velocity that is changing speeds. This shows that this student knows something about velocity and also helps build the student's self-confidence. Once the teacher can see that student is building more confidence, then begin to challenge that

...continued on page 4

WHITEBOARDING Q & A

Nilay Muslu, Deborah Hanuscin, Somnath Sinha, University of Missouri

I've been using whiteboards in my classroom with the Physics First curriculum, but I don't feel confident and wonder how to go about it the right way. I'm not sure my students are getting the most out of it- they seem to struggle with asking questions. How can I improve my whiteboarding skills and those of my students? Is it worth the effort?

WHY IS WHITEBOARDING IMPORTANT?

Whiteboards, or dry erase boards, provide opportunities for student thinking to become a visible part of the learning process. Their easy cleaning gives the opportunity for students to fix their errors, revise their thinking, and rewrite their ideas. Whiteboarding is a teaching method which helps students work collaboratively to present their understanding of classroom investigations. It is intended to foster two-way communication between teacher-student and student-student, versus to be a simple "reporting out" of groups to the class. Because a modeling approach to teaching physics emphasizes constructing and applying conceptual models, whiteboarding is an important part of this approach, as it gives students opportunities to articulate their developing models and refine their thinking (Jackson, Dukerich, & Hestenes, 2008).

HOW DOES WHITEBOARDING FIT WITHIN THE MODELING APPROACH?

Whiteboarding is well aligned and incorporated within a modeling approach. During the first stage of **model development**, small

groups discuss their ideas about the phenomenon to be investigated. After discussion, groups can share their ideas regarding their possible methods of investigation, anticipated outcomes, and variables (dependent and independent) related to the experiment. At this point, whiteboarding can help teachers guide students toward more feasible and practical options for their investigations. Following laboratory investigations, whiteboard again comes into play for presenting results to the class. Once the students complete their investigation, whiteboards can be used to share results and to help the class work toward developing general mathematical models. Whiteboarding is also useful during **model deployment**, during which students apply their ideas to new situations. As students whiteboard their solution/ideas, the teacher can recognize flaws in understanding and any emerging misconceptions.

HOW CAN WHITEBOARDING BENEFIT STUDENTS?

Whiteboarding benefits students in many ways. First of all, it creates an atmosphere in the classroom where they construct their own understanding and evidence-based knowledge. Before students write on the whiteboards, they discuss their ideas and construct a group consensus. Since students work together, whiteboarding provides opportunities for collaboration and peer learning, through which all students can take an active role in the learning process. Whiteboarding can foster dialogue not only within, but also across

groups. While sharing their whiteboards, all students have an opportunity to voice their ideas. It also helps students link concepts and see the relationships between ideas, and improves communication skills as students are challenged to express their ideas clearly and succinctly. These types of skills are applicable beyond the physics classroom (Jackson, Dukerich, & Hestenes, 2008).

HOW CAN WHITEBOARDING BENEFIT TEACHERS?

Teachers also experience many benefits of using whiteboards. Knowing students' prior knowledge is critical to the learning process. Whiteboarding provides a quick and cost-effective way of formatively assessing. It helps teachers diagnose areas of student difficulty and identify misconceptions. Through whiteboarding, teachers can get a sense of strengths and weaknesses of the class in understanding a particular concept or phenomena and provide scaffolding as needed. Additionally, they can be used to manage discussion by focusing students on the topic at hand. Whiteboarding can help teachers manage instruction in ways that are compatible with their philosophy of student-centered learning, in which students construct their own knowledge and understanding from evidence.

WHAT DOES RESEARCH SAY ABOUT THE USE OF WHITEBOARDING?

Research shows that whiteboarding can increase student achievement. Bush and Kelly (2004) examined the impact of white-

boarding on student learning in a high school biology course. These researchers compared traditional instruction to instruction with whiteboards, and found student achievement was higher in the whiteboard group. Interestingly, when surveyed, the majority of students didn't attribute their increased achievement to the use of whiteboarding. The authors suggested that this was because whiteboarding was a seamless part of the classroom activities, and students viewed this as a normal part of the learning process, versus a special add-on.

HOW CAN I EFFECTIVELY USE WHITEBOARDS?

Erekson (2004) suggests providing a list of 'Dos' and 'Don'ts' for students, to help them develop whiteboarding skills:

Henry, Henry and Riddoch (2006) provide three different examples of ways teachers can have students share whiteboards.

- **Museum Walk:** In a museum or 'gallery' walk, groups put their whiteboards on the wall or on a chair. All students walk and look the whiteboards. This gives a chance for students to see everyone's work. Then the class discusses what they see and what they noticed.

- **The Circle:** In this method, students make a circle and all groups hold their whiteboards. Therefore, students have chance to see all the whiteboards at the same time. Also it gives an opportunity to discuss differences in ideas between groups. It is important that the teacher shouldn't be the center of attention and that he/she stands outside of the circle.
- **Presentation:** Groups make presentations of their whiteboards. They display their whiteboards and explain their thinking and the drawings, graphs. Also they answer teachers' other groups' questions.

The authors also provide the following guidelines for teachers:

- Model the expected group behavior
- Give clear, specific guiding questions
- Distribute whiteboard assignments by section, idea or question. However, make sure that every student contributes to all segments of the whiteboard.
- Give plenty of space to the groups as they work
- Give two or more colors to each group
- Circulate and assist
- Allow time for group sharing and closure (Henry, et al., 2004)

WHERE CAN I GET MORE INFORMATION ABOUT WHITEBOARDING?

For more suggestions for implementing whiteboarding, check out the Leadership Blogs on SAKAI. Several Fellows have posted the following tips and ideas that have worked for them. Fellow Danielle Camarota surveyed colleagues about whiteboarding during the first few weeks of the semester and got some surprising results. You can read about it in her blog *So... What is whiteboarding?* Additionally, you can visit the folder "**Whiteboarding Resources**" in the RESOURCES section on SAKAI to find links to information in this article, useful websites, and an example of a rubric for whiteboarding developed by Bush and Kelly (2004). To share your own ideas, challenges, question, and comments about whiteboarding, enter the **Physics First Discussion Boards: Assessment** and post a topic!

REFERENCES

- Bush, D., & Kelly, M.G. (2004). *The impact of whiteboarding on learning by secondary school biology students*. Retrieved from ERIC database. (ED489953)
- Erekson, T. (2004). Assessing student understanding. *The Science Teacher*, 71 (3), 36-38.
- Henry, D., Henry, J., & Riddoch, S. (2006). Whiteboarding your way to great student discussions. *Science Scope*, 29 (7), 50-53.
- Jackson, J., Dukerich, L., & Hestenes, D. (2008). Modeling instruction: An effective model for science education. *Science Educator*, 17 (1), 10- 17.
- Wenning, C. J. (2005). Whiteboarding & Socratic dialogues: Questions & answers. *Journal of Physics Teacher Education Online*, 3(1), 3-10. Retrieved from http://www.phy.ilstu.edu/pte/publications/whiteboard_dialogues.pdf

TABLE 1: THE DOS AND DON'TS OF WHITEBOARDING

Do:	Don't:
<ul style="list-style-type: none"> • Include names of team members • Place a title of the experiment on the board • Sketch the findings of the experiment as a graph • State the relationship between experimental variables • Write large enough and legibly so people in the back of the room will be able to read it. 	<ul style="list-style-type: none"> • Spend too much time making it look perfect • Include lengthy data tables • Put extreme detail into graph • Put embellishments on it (border art, clip art, etc.) • Make it look cluttered

WHITEBOARDING ...continued from page 1
student with more difficult questions. By all means, challenge the gifted student as well! It's amazing to see how much students learn from other students. They could provide the voltage for the resistor! It's differentiation of instruction without all the extra work.

#6 MAKE THE CLASS ASK QUESTIONS

Every teacher has "the class" that came to school eating a breakfast of zombie loops, and who have dead looks on their faces. Make them ask questions to become more engaged. Before the class even begins, tell a certain number of students to expect to be called on in class and it's part of their participation grade for the day. It's also important to always ask the kids what they think after the groups have presented their whiteboard. Another thought is to have the teacher do the whiteboarding for a question. Purposefully make mistakes and make the students ask the questions.

Of course there are plenty of other tweaks that could be made to the whiteboarding concept. The important thing to remember is to find what works best for you and your students.

WHITEBOARDING OPTIONS

Marcia Holwick, North Kansas City Schools

Using the framing questions in the Forces unit, I had student groups whiteboard two of the five questions. Since our students have laptops, they took pictures of their whiteboards and posted the photos on the discussion board in our eCampus class. Other students posted questions and comments about the photos. Since more than one group did each question, the discussion threads were rich and meaningful, especially when the posted solutions differed.

In order to increase student accountability, I had students "whiteboard" on scratch paper. They must follow the same criteria as we do with the marker/whiteboard format. I then use my document camera to show their work via my projector. It is fun to show two different approaches to the same problem to stimulate student discussion.

The advantage is that I can give students credit for their work even if we do not have time in class to review their work. As with traditional whiteboarding, grading of these papers is based on the extent that they show their thinking and reasoning. The grades are not based on accuracy of the answers, but the quality of the attempt.

PRESENTATIONS AND PUBLICATIONS 2010

NSF LEARNING NETWORK CONFERENCE, WASHINGTON, DC - JAN 24-26, 2010

- *Year 1 Implementation: A TIME for Freshman Physics in Missouri*, Meera Chandrasekhar, Sara Torres, Dorina Kosztin, Martha Henry and Keith Murray

NSTA NATIONAL CONFERENCE, PHILADELPHIA, PA, - MARCH 18-21, 2010

- *Using Inquiry and Modeling to Study Electrical Resistance*, Meera Chandrasekhar and Dorina Kosztin
- *Cut and Glue to Learn About Uniform and Accelerated Motion*, Dorina Kosztin and Meera Chandrasekhar

PHYSICS EDUCATION RESEARCH CONFERENCE, PORTLAND, OR, JULY 2010

- *Supporting Teacher Leadership for Physics Education Reform: Where do we Begin?* Contributed poster, Carina.M. Rebello, Somnath Sinha, Deborah Hanuscin

NSTA REGIONAL CONFERENCE, KANSAS CITY, OCTOBER 28-30, 2010

- *Spark Timers, Glue and Scissors to Study Motion*, Dorina Kosztin and Meera Chandrasekhar
- *What's under the Curve?* Meera Chandrasekhar and Dorina Kosztin

ASTE CONFERENCE, MINNEAPOLIS, MN JANUARY 18-22, 2011

- *Supporting the Development of Science Teacher Leaders – Where Do We Begin?* Paper presentation, Carina.M. Rebello, Somnath Sinha, Deborah Hanuscin

PUBLICATIONS SUBMITTED (CURRENTLY UNDER REVIEW BY JOURNAL):

- *Teacher Professional Development must come First for 'Physics First' to Succeed*, Meera Chandrasekhar, Deborah Hanuscin, Carina M. Rebello, Dorina Kosztin and Somnath Sinha, Journal Educational Chronicle
- *Leadership in Freshman Physics*, Carina. M. Rebello, Deborah Hanuscin, and Somnath Sinha, . The Physics Teacher.P
- *Confronting Myths About Teacher Leadership*, Somnath Sinha, Deborah Hanuscin and Carina M. Rebello, The Science Teacher.

PHYSICS FIRST 2010

Meera Chandrasekhar, University of Missouri

A year ago, in early 2010, we were scrambling to review applications, run accepted districts through the sorting hat, and send out acceptances to Cohort 1 and Cohort 2 Fellows - all so we could lean back and say "let the work begin!" We have come a long way.

The summer academy in June was designed to be a concentrated shot of content, pedagogy and leadership for Fellows, woven into which were strands of support from math teachers, administrators and coaches. Coaches are scheduled to visit Fellows monthly, and are available online on SAKAI (a coach is available daily). We have been hearing a lot of good things during our monthly teleconferences with the coaches, and are learning from reading their observation forms.

Curriculum for the academy is designed to be imported to the 9th grade classroom. Lessons are constructed by the curriculum revision team, which consists of academy instructors. The Team's work is only the first round, however. We want to incorporate feedback from Fellows - send us your edits, and ideas for structural changes that would help make the curriculum more useful in the classroom. Do send us suggestions (ideally, through the discussion board on SAKAI).

Academic year follow-up and support are a vital part of professional development. Research has repeatedly shown that the most effective programs include engagement among participants, periodic feedback and support over the academic year, and multi-year attendance. The online website, three

follow-up meetings and PLCs are designed to promote collaboration among Fellows and project staff, and to provide support as needed. Remember, even if an individual Fellow does not feel the need for support, their expertise is valuable and welcomed by their colleagues.

This issue of the newsletter is a perfect example of the product of Fellows' brainstorming sessions at the October follow-up meeting. There are three great articles on whiteboarding, which is a new endeavour for many Fellows. Articles on absenteeism and differentiation gather ideas from several Fellows and staff.

We welcome articles from Fellows and district personnel. You have great ideas, and the rest of us want to hear about them. We know that you are busy, and don't need "one more thing." Remember that articles can be as short as half a page. The editorial team can help edit or polish it. Writing articles can be part of leadership activities (and yes, articles and all the other feedback Fellows provide counts for the activity log!). Submissions may include:

- A profile of your district
- Observations of what has worked well in classrooms
- Ideas for PLC collaborations, or a story on what has worked in a PLC
- Stories about collaborations with math or science teachers
- Ideas of how administrators can support or have supported Fellows
- Puzzles for the Brain Benders column

(Dorina welcomes a rest!)

- Pictures of classrooms, whiteboards, student work, etc. If students are pictured, be sure they have signed a release form

Our project now boasts two regular publications - this newsletter, (published in April, August and December), and an e-letter, which will be published in the intervening months during the academic year. The purpose of the e-letter is to provide easy links to electronic resources specifically for Fellows, while this newsletter is meant for a broader audience.

The Physics First team has been busy submitting abstracts for presentations and manuscripts for papers (see page 2). Several abstracts have been accepted to conferences in 2011. One presentation has been accepted to the NSF Learning Network Conference in Jan 2011. Three presentations have been accepted to Interface B (Feb 2011), and two to the national NSTA meeting in San Francisco (March 2011). Let us know if you are interested in presenting in 2012 - conference deadlines come earlier than you think! A list of presentations and some of the accompanying PowerPoints are on the website, www.physicsfirstmo.org/participants/conferences.php.

Stay warm!

PHYSICS FIRST FELLOW OPENINGS

A limited number of spots are available for Cohort 2

**APPLICATION DEADLINE
JAN 8, 2011**

www.physicsfirstmo.org

ABSENTEEISM IN THE CLASSROOM

Glenn Owens, Coach

Absenteeism is a problem and it has varying degrees of severity. A student who misses one day of "normal classroom activity" will probably not be at a huge loss in the whole big scheme of things, and the make-up could be done by picking up any handouts and/or copying the notes from a friend's notebook.

If the day that a student missed was a review, a lab or a day when everything went well and the graph of "learning vs time" had an extremely high slope, then that day will be more of a loss to the student and an experience that "make-up" work cannot duplicate.

Here are some the problems that were discussed at the October Follow-Up meeting:

- Students who miss a day or so occasionally
- Students who enroll late, classified into the following categories:
 - Due to schedule changes: several days to a couple of weeks.
 - Transfer students: several

weeks or quarters.

- Students from the alternative school program: several weeks or quarters.

After a few minutes of discussion, we discovered that the policies for absenteeism vary greatly from district to district and, in the case of special services and alternative education, the policies vary within a school district. That, in itself, was enlightening.

Because Physics First relies heavily on discovery, I asked specifically, "What do you do when students miss a lab?" Here are some of the suggestions/solutions that were offered:

One teacher puts lab materials into a "shoe-box" lab and the student can take it home and follow the directions to collect data or complete the lab. In contrast, another teacher commented that he could not use that with his students because he would not get it back, or if it did come back, it would be broken.

If a student is not in class because of an "In School Suspension," perhaps a call to the monitor of the detention hall and a special release could be granted for that student to attend class with the lab. This does work, but some schools have a policy that will not allow a student to leave the ISS room.

The one answer that received universal appeal for lab work was to make a video tape of each lab during the summer academy and put it on a DVD or make it available on-line. If a student missed the lab, the student could take the DVD home (or access it on-line) and see the lab as it was "done by professionals." Another advantage to having the lab on DVD is that the teacher could review it to make sure that all of the materials were set-up correctly.

We welcome more of your suggestions. Please add to our discussion topic on absent students in SAKAI.

PHYSICS IS FUN
Majed Dweik, Coach

In my coaching observations since the beginning of this school year, I continue to see an increase in the comfort levels of Physics First Fellows teaching physics. The summer academy made a huge impact on the Fellows in two areas: content and pedagogy.

Teaching of content units during the academy and the support materials provided to the Fellows resulted in a smooth transition towards teaching the Physics First project curriculum. This transition is accomplished also through the commitment from the Fellows and the countless hours invested by them. The Fellows' efforts then show a positive impact on students. One of my Fellows was approached by another teacher at her school who asked her what she was doing in her class, because the students cannot wait to go to physics class!

The second area of impact seen in Physics

First Fellows is the application of the pedagogy and the style learned in the Summer Academy. This interactive teaching style and activity-based materials result in positive perceptions about physics and make it a fun class. I am impressed when I observe special education students' performance as they conduct hand-on-activities, use scientific terms, equipment, and collect and analyze data.

This success and positive impact are credited to the hard work and effort of the Fellows. I have observed innovative ideas applied in the classroom. These achievements do come with challenges such as time required to prepare teaching materials. Several tools play important role in meeting those challenges such as availability of coaches in person and online, PLC meetings, coaches and management meetings, and follow-up meetings throughout the year.

STUDENT ABSENCES

Becky Schauwecker, North Kansas City Schools

“DID WE DO ANYTHING WHILE I WAS GONE???”

When students are absent in a Physics First classroom they can miss one or more of the following instructional activities: input from reading pages, whiteboarding, pre-lab and lab exploration, computer simulations, PowerPoint presentations, video clips and a variety of practice pages.

Most (if not all!!) teachers agree that the most difficult missed assignments to make up are labs.

Melissa Kelly (About.com), says it is difficult for teachers to develop alternate assignments for students absent on lab days because many times it is hard to repeat a lab outside of the regular school day. Also, the amount of planning required in providing such experiences can result in an added layer of time-consuming teacher planning.

Many teachers develop classroom management systems designed to ensure that opportunities are available to absent students to participate in and experience the same lab experiments as students attending class regularly. And many schools now set aside time

each day for teachers to re-group students for a variety of purposes including making up missing work. Examples are listed below.

Designated Lab Day: One day a week the teacher can be available before or after school to repeat a lab. As the lab is being done during school, the teacher sets aside necessary materials and equipment at an “absent student station.” This can become part of the classroom management plan where students set this up while assembling their own lab station.

Buddy System/In-Class Absent Student Plan: In this system, students are assigned buddies who will gather materials if the lab buddy is absent. Buddies assist the student upon return from an absence. This could mean that the lab would be made up during class time, or arrangements could be made to do the lab during a study hall, before or after school.

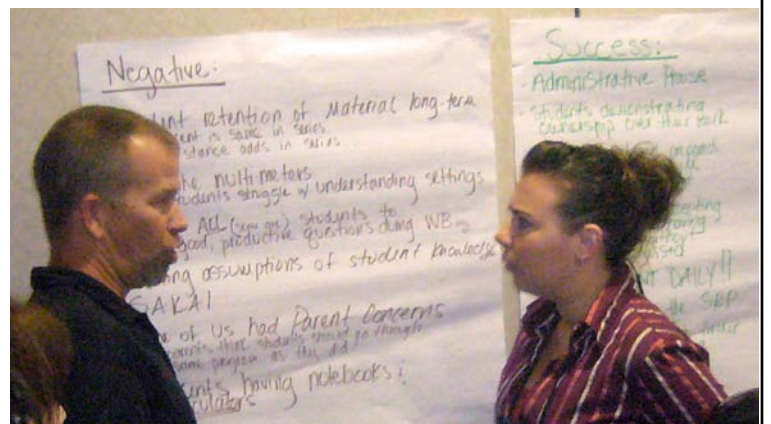
Study Hall/Student Achievement Block/ Team Studies Classes: Many schools have set aside time for students to travel to academic areas of need to receive assistance. This includes opportunities to make up missing work due to ab-

sences. Science teachers can use this time to have students make up a lab the day the student returns after being absent by requesting certain students come to a science classroom during the school day for the purpose of making up a lab.

A Plus: A-Plus students are required to accumulate hours outside of the school day as part of the requirements for the A Plus program. These students can help with lab set up and assist students making up lab work.

Determining which type of system best meets your needs and getting it established might be the toughest part! But once in place, such structures can support more than just the randomly absent student. It can provide opportunities for mid-semester transfer students, students new to the district, pull-out students, suspended students and students serving in-school suspension.

Areas needing further consideration would be activities for alternative school students who need to align with the regular education setting and how to address the needs of home-bound students.



DIFFERENTIATED INSTRUCTION

Jack Wieggers, Coach

During the October 30, 2010 Follow-up meeting, Physics First coaches and staff facilitated discussions on topics of interest, including unit content, math issues, whiteboarding, pacing, absenteeism and differentiation. Here is a summary of the discussions that took place about differentiated learning and instruction.

The discussion on differentiated learning/instruction revealed that Physics First Fellows are thinking about many areas that need these strategies. Differentiation can be applied to summarizing reading/writing, curriculum, assessment, presentation of the results of investigations and classroom management (grouping students). Reasons offered for differentiation were learning style and/or stages of development and/or multiple intelligences.

There were four different strategies described for summarizing reading/writing assignments:

- a. double diary entry,
- b. raps/poems/songs,
- c. identification of the most important sentences by crossing out less important sentences or paragraphs, and

d. graphic organizer (Frayer Model). The Frayer Model is an adaptation of the concept map.

The framework of the Frayer Model includes: the concept word, the definition, characteristics of the concept word, examples of the concept word, and non examples of the concept word. It is important to include both examples and non examples, so students are able to identify what the concept word is and what the concept word is not). Students are allowed to choose a strategy to represent their knowledge.

Strategies for differentiation include differentiation of laboratory activities. Software programs are available to allow for differentiation in laboratory activities that.

There were strategies suggested for assessment. Create sets of cards with questions that require different DOK levels. Create a test item where the student does an activity. For example a student demonstrates that s/he can assemble circuits—no written answers.

There were strategies suggested for grouping students. Differentiation can be based on student development or skill level. Students

can be grouped so that students of different levels are together. Alternatively they can be paired so that strong students are with students that are doing less well (i.e. peer coaching). The size of the group (two or three or four students) may be important.

There were strategies on reporting results of investigations. An example given was description of motion: Students can describe motion with: words, motion diagrams, tables/graphs, analytic (equations). Students can choose the type of representation. When students do whiteboarding, students can choose how to report answers or results—words, drawings, graphs, and so forth.

Differentiation can be based on learning styles and multiple intelligences. Examples of learning style suggested were kinesthetic, auditory, and visual. There are tests available on the internet to test different learning styles.

The next e-letter will include more resources for differentiation. In the meantime, continue the conversation on Sakai's discussion topic "differentiation" under the "general implementation" category.



SUCCESSSES AND CHALLENGES

Feedback from Participant Groups

October 30, 2010 Follow-Up Meeting

	SUCCESSSES	CHALLENGES
GROUP A	<p>Kids LOVE it (labs, whiteboarding, all of it)</p> <p>Buy-in by kids, parents, administrators</p> <p>Deeper understanding</p> <p>Problem-solving skills</p> <p>Active student participation</p> <p>AHA! moments by students</p> <p>CwC as a good indicator of understanding (if para understands it, kids can get it)</p>	<p>Differentiation for academically challenged students (Low, SPED, autistic)</p> <p>Pacing</p> <p>Instructional content – order of concepts</p> <p>Helping kids accept “being wrong” in a whiteboard setting</p> <p>How to make instruction effective when there is a sub</p> <p>Also, handling student absences</p> <p>Students with no Algebra</p>
GROUP B	<p>Engagement of students -- whiteboarding</p> <p>Improved discipline</p> <p>Attacks content from multiple dimensions</p> <p>Integration with math dept.</p> <p>More organized than ever</p>	<p>Talking during whiteboarding</p> <p>Lots of wasted instructional time</p> <p>Pacing</p> <p>Students disorganized</p> <p>SAKAI</p>
GROUP C	<p>Administrative praise</p> <p>Students demonstrating ownership over their work</p> <p>Feeling confident and prepared with regard to curriculum preparation and benefit</p> <p>Students open and accepting of being wrong or having misconception without feeling embarrassed</p> <p>Engagement daily!!</p> <p>Ability to utilize the Student Reading Pages with a variety of reading strategies to further student comprehension</p>	<p>Student retention of material long-term e.g., current is same in series, resistance adds in series</p> <p>Using the multimeters – students struggle with understanding settings</p> <p>Getting all (some are) students to ask good, productive questions during whiteboarding</p> <p>Making assumptions of student knowledge</p> <p>Some of us had parent concerns – parents think students should go through same program as they did</p> <p>Students having notebooks and calculators</p>
GROUP D	<p>Success with dialogue</p> <p>Whiteboarding</p> <p>Success with challenging students: Hands-on = greater understanding</p> <p>Co-teacher success</p> <p>More teacher buy-in (administrators, co-teachers)</p> <p>G.U.E.S.S. – wonderful!!</p> <p>Formative assessment – summary pages</p> <p>Bellringers (review, lead-in, preview)</p>	<p>Slower pace</p> <p>Student social interaction</p> <p>Transfer / absent students (also slows pace)</p> <p>Applying pedagogy to other content</p> <p>Students expressing ideas</p> <p>Student-led discussions</p>
GROUP E	<p>Student involvement/increased involvement</p> <p>Growth in implementing modeling</p> <p>Whiteboarding</p> <p>Engaged students = happy parents</p> <p>Student buy-in with program</p> <p>PHET simulation for Ohm’s Law</p>	<p>Fear of implementing a new style</p> <p>Equipment – Ammeters and LEDs</p> <p>New students / absent students</p> <p>Students’ fear of math</p>

Solutions to August 2010 Brain Benders

The Fake Coin

You have 8 identical looking coins, but one is heavier than all the other. How can you identify the heavier coin? You may use only a pan balance and you are allowed only two measurements.

Solution:

Place three coins in each pan. There are two possibilities:

- a. All the coins are the same, so the balance is straight. The heavier coin is one of the two left, all you have to do is use the balance to identify it.
- b. One of the pans contains the heavier coin. In this case, take the coins from the heavier side and place one

coin in each side. If one of them is heavier it will be indicated by the scale. If the two coins have the same weight, the third coin is the heavier one.

Choo-choo, Crash, Bang

Two trains are moving toward each other with speeds of 17 and 43 mph. How far apart are they 1 minute before they collide? Hmm.. do we need more information here? Actually, not.

Solution:

The two trains approach each other with a relative speed of $17 + 43 = 60$ mph, that is 1 mile / minute. Hence 1 minute before collision they are one mile apart.

The Difference Between Mass, Volume and Weight

(from "190 Ready to use Activities that make science fun," by George Watson)

Read the paragraph, and find the word from the choice box below that should appear in each numbered box. Write the words against the corresponding numbered cell on the left. No word may be used more than once.

mass ✓ blast ✓ expands ✓ same ✓	weight ✓ float ✓ gravitational ✓ location ✓	accumulated ✓ Earth's ✓ constant ✓ volume ✓	material ✓ escaped ✓ force ✓ changed ✓	size ✓ different ✓ space ✓ object ✓
------------------------------------------	------------------------------------------------------	------------------------------------------------------	-------------------------------------------------	----------------------------------------------

1: MATERIAL	<p>HERE'S THE PARAGRAPH YOU NEED TO DECIPHER:</p> <p>THE TERM "MASS" REFERS TO THE AMOUNT OF SUBSTANCE OR <u> 1 </u> IN AN <u> 2 </u>.</p> <p>THE TERM "VOLUME" REFERS TO THE ACTUAL <u> 3 </u> OF THE OBJECT. THE SIZE CAN BE CHANGED BUT THE <u> 4 </u> WILL REMAIN <u> 5 </u>. FOR EXAMPLE, WHEN WATER IN A CUP FREEZES, IT <u> 6 </u>, INCREASING THE VOLUME, BUT THE AMOUNT OF WATER OR MASS STAYS THE <u> 7 </u>.</p> <p>WEIGHT IS <u> 8 </u> FROM MASS AND <u> 9 </u> BECAUSE THE WEIGHT OF AN OBJECT IS THE AMOUNT OF <u> 10 </u> PULL ON AN OBJECT. IT DIFFERS FROM MASS IN THAT <u> 11 </u> WILL CHANGE FROM ONE <u> 12 </u> TO THE NEXT BUT MASS WILL NOT CHANGE. LET'S LOOK AT AN ASTRONAUT. WHILE THE PERSON IS IN THE <u> 13 </u> SUIT WALKING TO THE SPACE SHUTTLE ON EARTH BEFORE TAKEOFF, HE/SHE MAY HAVE AN <u> 14 </u> WEIGHT OF 270 POUNDS. (THIS IS WHY ASTRONAUTS WALK SLOWLY TO THE SHUTTLE.) FIFTEEN MINUTES AFTER <u> 15 </u> OFF, ASTRONAUTS WEIGH ZERO POUNDS BECAUSE THEY ARE IN SPACE AND HAVE <u> 16 </u> THE <u> 17 </u> OF THE <u> 18 </u> GRAVITY. THEY CAN <u> 19 </u> AROUND IN WHAT ON EARTH WAS A 270 LB WEIGHT. THE MASS OF THE PERSON AND THE MASS OF THE SPACE SUIT HAVE NOT <u> 20 </u>, ONLY THEIR WEIGHT HAS CHANGED.</p>
2: OBJECT	
3: SIZE	
4: MASS	
5: CONSTANT	
6: EXPANDS	
7: SAME	
8: DIFFERENT	
9: VOLUME	
10: GRAVITATIONAL	
11: FORCE	
12: LOCATION	
13: SPACE	
14: ACCUMULATED	
15: BLAST	
16: ESCAPED	
17: WEIGHT	
18: EARTH'S	
19: FLOAT	
20: CHANGED	

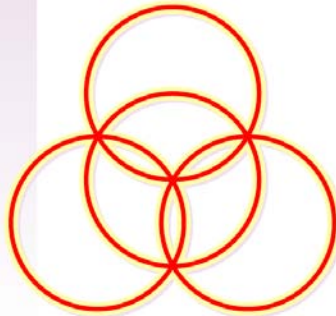
BRAIN BENDERS

Dorina Kosztin, University of Missouri

INTERSECTING CIRCLES

Draw the four intersecting circles without taking your pencil off the paper, nor going over any part of the line twice.

(www.puzzles.com)



CROSSING THE RIVER

Three kids from Bristol went for a walk. About a mile into the walk, they came to a deep, wide river. There was no bridge. They didn't have a boat or raft, or any materials to make one. None of them could swim. How did they get across?



GYMNASTICS

A true story: the bishop was hanging around minding his own business. Suddenly a horse jumped over a castle and landed on him, and he found himself disappearing from the landscape. Where did it happen?



ATOMIC PLANT

A man and his son were on a tour of an atomic power plant. In the control room, the boy asked if he could see the controls for the reactor core. The head physicist said yes, and explained how the controls worked. After the boy left, the head physicist turned to an assistant and said, "That was my son."



How could that be?

MYSTERY STUFF

Lisa walked out the back door of the farmhouse on a Thursday afternoon and found a man's pipe, a scarf and three lumps of coal lying on the wet grass near the barn. The nearest neighbors lived a mile away, and no-one had visited that day. Where did the objects come from?



Answers to Brain Benders will be published in the next issue of the Physics First Newsletter, April 2011

FAST FACTS:

Grant period: September 1, 2009 - August 31, 2014
Funding Agency: National Science Foundation
Target Participants: Ninth grade science teachers in Missouri school districts
New application deadline: Jan 8, 2011
2011 summer academy: June 6 - July 1, 2011
Follow-up meetings for Cohort 1: Oct 30, 2010 (Kansas City); Feb 19, 2011 and April 9, 2011 in Columbia (revised dates)
Pre-Academy Meeting for Cohort 2: April 16, 2011
Contact:

Sarah Hill

Department of Physics and Astronomy
University of Missouri, Columbia, MO 65211

Telephone: (573) 882-7997

FAX: (573) 882-4195

Email: hillsar@missouri.edu

Further information: www.physicsfirstmo.org

EDITORIAL BOARD:

Sarah Hill hillsar@missouri.edu

Meera Chandrasekhar meerac@missouri.edu

Karen King kingkar@missouri.edu

© 2010 A TIME for Physics First

Department of Physics and Astronomy

University of Missouri, Columbia MO 65211

Support: This project is supported by the National Science Foundation grant # NSF DUE 0928924. NSF is not responsible for the opinions expressed in this publication.





All photographs in this issue are of Cohort 1 Physics First Fellows, Coaches and Physics First instructors at the first follow-up session in Kansas City on Oct 30, 2010.



From:
A TIME for Physics First
223 Physics Building
University of Missouri
Columbia MO 65211