A TIME for Physics First

Academy for Teachers
Inquiry and Modeling Experiences for Physics First

Leadership in Freshman Physics, 2009-14

NEWSLETTER: Vol 7, No. 2, August 2013

Follow-Up at the STOM Fall Conference

Sarah Hill, University of Missouri

The first Follow-up meeting of 2013-14 is scheduled Saturday, Oct. 5 in conjunction with the annual Science Teachers of Missouri Fall conference at Battle High School in Columbia. Registration for the two-day conference includes an annual membership plus attendance at the conference and Saturday lunch.

This 'conference within a conference' format provides a full-day schedule of Physics First related sessions within the STOM conference. Participants can choose to attend the entire menu or select sessions a la carte. Hosting the Physics First conference within STOM thus provides additional opportunities for dissemination of program activities to teachers from non-participating schools and districts, but also enriches opportunities for Physics First teachers to extend their professional development beyond program offerings. The conference program is available on the STOM site at http://www.stom.org/conference.php

The PF project is registering and paying for all Fellows, Coaches, Mentors, faculty and management, as well as a few additional groups.

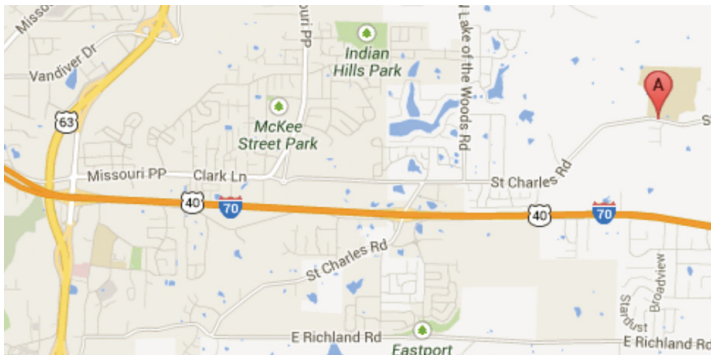
The additional groups, defined below, are included courtesy of project PI Meera Chandrasekhar, who has generously offered to use money awarded to her as a finalist in the Cherry Award process to pay registration. See this link for more information about this prestigious award: http://physics.missouri.edu/meera-chandrasekhar-finalist-cherry-award/

The two additional groups invited to the conference, in limited numbers, are: Physics First teachers who work in participating districts but are not currently project Fellows, and Physics First teachers from the previous project.

Current Physics First Fellows may invite district colleagues who teach freshman physics, especially those who may have been trained or mentored by Fellows. Those who meet criteria will need to fill out the attendance form found here: http://www.physicsfirstmo.org/participants/forms.php with the password available in the July 15 announcement posted on Sakai or from Sarah Hill, contact info below. This opportunity scaffolds additional support to recruit freshman physics colleagues into our network – and to further promote the sustainability of the goals of this project.

Former Physics First Fellows have also been invited via email and should fill out the form on the PF site at the same link as above. The form password is included in the email invitation or from Sarah Hill directly.

Contact Sarah Hill at hillsar@missouri.edu or (573) 882-7997.



Map: Battle High School, 7575 St. Charles Rd, Columbia Mo 65202. Take exit 131 on I-70.

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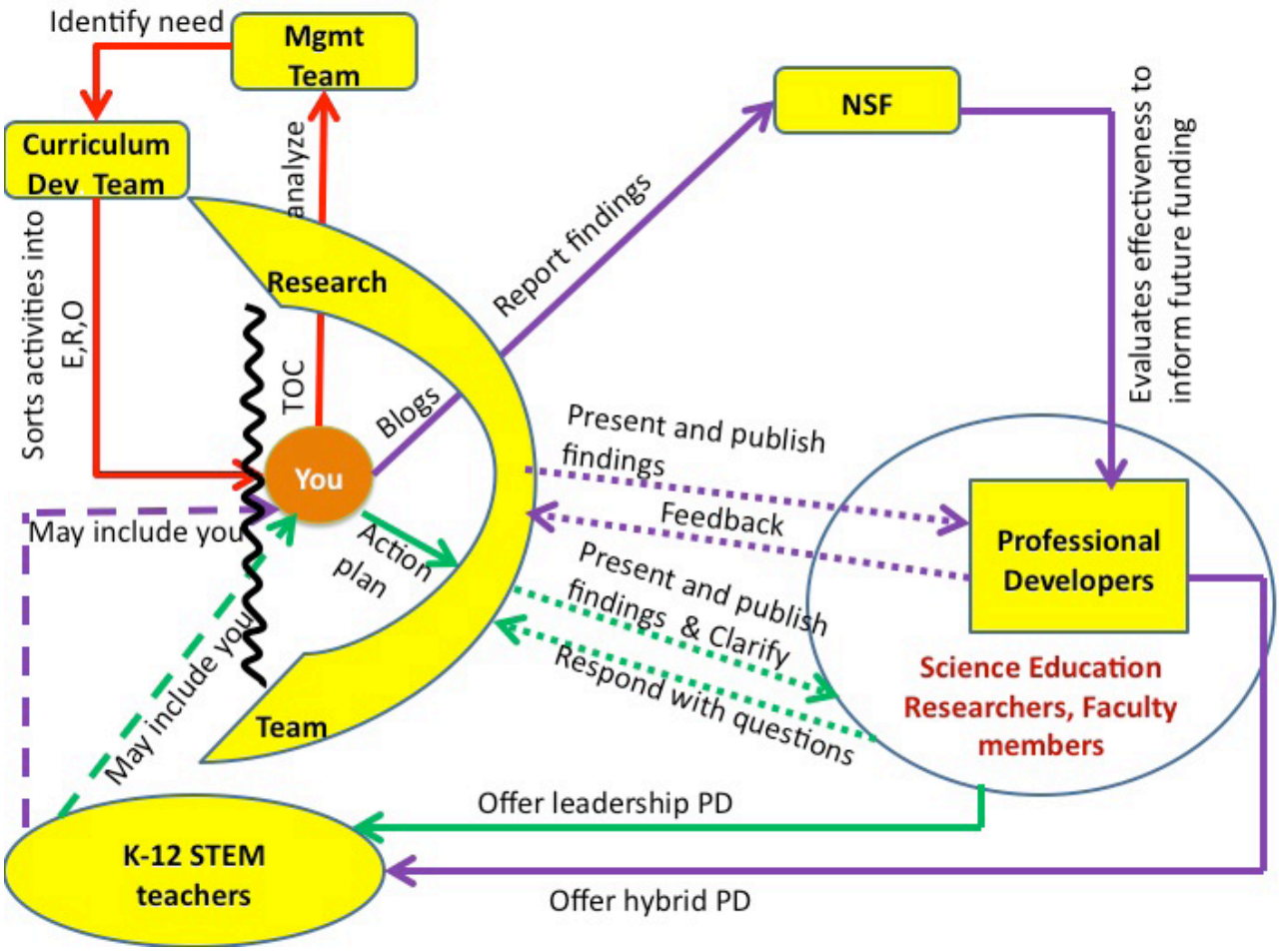
Pulling Back the Curtain: What Exactly Does the Research Team Do?

Deborah Hanuscin, Somnath Sinha, Nilay Muslu, Jaimie Foulk

Have you ever wondered where all those assignments and forms you submit end up? Is there a giant black hole that gobbles them? Are they sitting in a file cabinet somewhere gathering dust? Are the graduate students now buried under the piles of paper? Of course not! These data are important—maybe more important than you realize. In this article, we'd like to give you a 'peek behind the curtain,' so to speak—and to let you know what the research team does, how your data are used, who benefits, and what a critical role YOU play in this process. We'll use the figure below to highlight three specific examples, though there are many more. The colors correspond to the cases, to help you follow the feedback loop.

Case #1: The Table of Contents Inventory

Check, check, check… filling out these forms doesn't seem too hard. Can these really give us much useful information? Indeed! As shown in the figure, these are part of a feedback loop. Our research team compiled your data, analyzing and graphing aspects of your implementation of the curriculum as a whole and for each unit. This revealed that, on average, Fellows were implementing only about half of the curriculum! When this was shared with the program's Management Team, they identified the need to provide more support for teachers in selecting those activities most critical to supporting student learning. The curriculum development team revisited the curriculum in light of this. As a result, you were provided guidelines about 'Essential,' 'Recommended' and 'Optional' activities for each unit.



The ToC Inventory also gives us an idea of which lessons are primarily adapted by teachers, rather than implemented as written. This can highlight a potential need for revision to these activities.

Case #2 Blogs

Blah, blah, blah… blog, blog, blog. You may ask yourself, *Does anyone really care what I write?* While your colleagues read and respond to your posts, the research team has also kept track of your blogs throughout the program. The Physics First program funder, the National Science Foundation (NSF), is interested in 'hybrid' professional development that utilizes face-to-face and online interaction. Our research team analyzed your blogs to better understand how you use them and how blogging supports your development as teacher leaders. We presented findings at both the NARST research conference and the NSF Learning Network Conference. We met other professional developers and researchers who were implementing and studying hybrid programs and learned from each other. Additionally, Ya-Wen has conducted her dissertation research on how you utilize and benefit from face-to-face coaching and online mentoring. She has found important differences in the type of support Fellows seek through these two different delivery models. As the NSF sees our research outcomes and evidence of the effectiveness of the program, this informs their future funding of Math & Science Partnerships. In this manner, our research indirectly benefits other teachers (and perhaps you again!) as these new programs and opportunities arise.

Case #3 Leadership Action Plans

Your leadership action plans help guide your own activities during the school year, but they also help guide our thinking about how to best support the development of teacher leaders. Through what pathways do teachers become leaders? What does teacher leadership look like for teachers at different career stages? These are questions that professional developers have pondered, and that Somnath is investigating more deeply for his dissertation study. Our team's research and his work have helped shed some light on these questions. We wrote a manuscript about this work in *Science Educator*, published by the National Science Education Leadership Association. We were pleased to receive contacts from several other professional developers following publication of the article and were able to exchange ideas about program design, specific workshop activities, and helping teachers develop action plans. As a result, our work has informed other programs in their endeavors to promote teacher leadership.

Conclusions

As you can see from these three cases, data collection is not just something needed to keep Dr. H and her research assistants, Ya-Wen, Somnath and Nilay busy… Research is a vital part of the Physics First program! Ultimately, the results of our research benefit not only you, but also many others in the science education community as a whole.

Conference Presentations

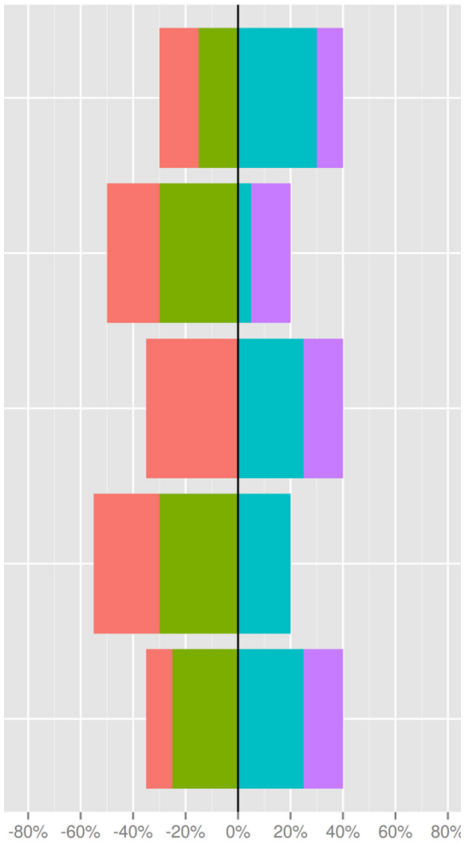
Science and Mathematics Teacher Imperative 2013 National Conference, St. Louis, MO, June 6-8, 2013

M. Chandrasekhar, D. Hanuscin, C. Bergin, P. McFarling, B. Murphy and A. Craver, *Mentoring and Supporting Teachers at A TIME for Physics First* (poster).

National Association for Research on Science Teaching, San Juan, Puerto Rico, April 2013

Hanuscin, D., Rebello, C., Sinha, S., Cheng, Y., Muslu, N., Foulk, J., & Chandrasekhar, *M. Examining Fidelity Through Two Lenses: Teachers' Implementation of a Year-Long Curriculum in 9th Grade* Physics.

Sinha, S., Kuby, C., & Hanuscin, D. *Teacher Leadership Pathways as Seen Through Blogs.*



What Else Can We Do With Sunglasses?

Meera Chandrasekhar, Dept. of Physics & Astronomy, University of Missouri

Polarized sunglasses have become ubiquitous in our daily lives. We just EXPECT them to cut out the "glare" of a bright day and shade our eyes. How do they work, and what can we learn with just a pair of polarizing sunglasses?

Light is an electromagnetic wave. The adjective "electromagnetic" implies that something that is electric and magnetic is doing the "waving." Light is also a transverse wave, which means that whatever is "waving" is perpendicular to the direction in which the wave travels. In electromagnetic waves, an electric field oscillates ("waves"). The electric field is accompanied by a magnetic field that oscillates along with it, but is rotated in a direction that is 90˚ from the electric field. The direction in which the wave travels is 90˚ to *both* the electric and the magnetic fields.

So what does polarization mean? In ordinary light, such as that from a light bulb, or even direct sunlight, the direction of the electric field is random. It does not point up and down, as in Figure 1, but might point in all different directions, as in Figure 2. When the electric field of the wave points in all different directions we call the light unpolarized. If we use a device and just isolate one of those directions, say the up-down direction, that light is called polarized. Figure 3 shows light polarized in the vertical or up-down direction.

Producing and detecting polarized light

Polarized sunglasses are an inexpensive device that produce polarized light. The lenses are made of a polymer that is called a polarizer. Polarizers have two simple properties, as shown in Figures 4 and 5. When unpolarized light goes through a polarizer, the light that emerges is polarized. The direction in which light is polarized is parallel to the transmission axis of the polarizer.

In Fig.5, we look at what happens to (already) polarized light when another polarizer is placed in its path. The bottom polarizer produces polarized light whose electric field is vertical (up-down, indicated by the arrow). If the top polarizer's axis is parallel to the incoming polarization (Fig 5, left), the light comes through almost unchanged in brightness. If the polarizer's axis is perpendicular to the incoming polarization, it is blocked (Fig. 5, right). If the axis of the second polarizer is at an in-between angle, some light gets through.

The polarizer, then, can be used to *produce* polarized light, but also to *detect* polarized light.

How, then, do sunglasses work?

Sunglasses work in the detector mode. When rays of sunlight are scattered off molecules in the atmosphere (air, dust, water vapor), the process of scattering makes the sky blue, but also polarizes the light.

On a bright day, skylight is partially polarized, which means it has

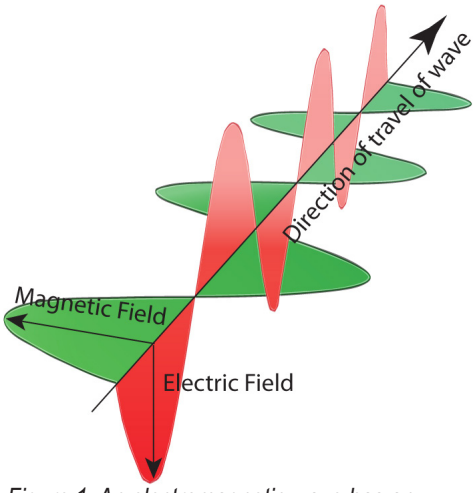


Figure 1: An electromagnetic wave has an electric field and a magnetic field that "wave." The magnetic field is perpendicular to the electric field, and both are perpendicular to the direction in which the wave travels.

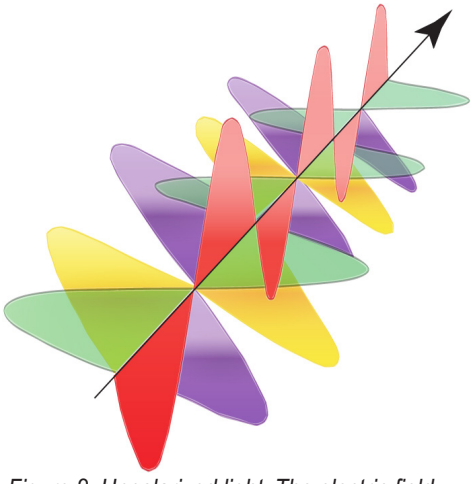


Figure 2. Unpolarized light. The electric field waves in all possible directions (but is still perpendicular to the direction in which the wave travels.)

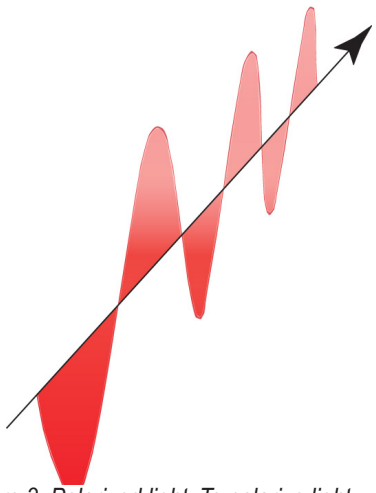


Figure 3. Polarized light. To polarize light, we must isolate the waves that have a specific direction in which the electric field oscillates. The waves shown are polarized in the vertical or up-down direction.

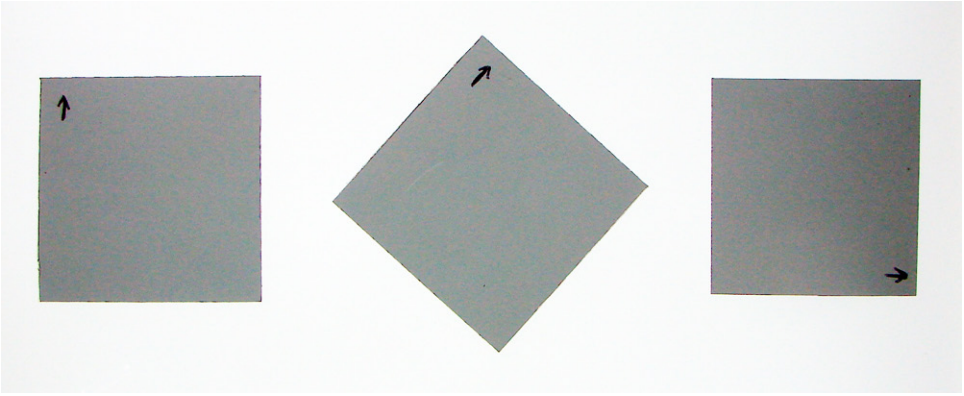


Figure 4. A polarizer is placed on a source of unpolarized light. The polarizer filters the incoming unpolarized light and produces polarized light. Regardless of the direction of the transmission axis of the polarizer (marked by the arrow), the intensity that comes through is the same, about half that of the unpolarized light.

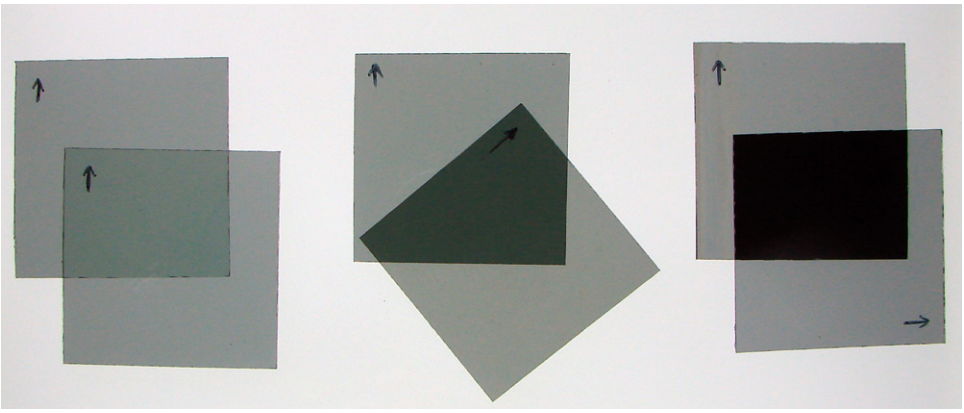


Figure 5. Two polarizers are placed on a source of unpolarized light. The bottom polarizer polarizes the incoming light.
Left: The top polarizer has its axis parallel to the bottom polarizer. Almost all the light polarized by the bottom polarizer comes through.
Center: The top polarizer has its axis at an angle to the bottom polarizer, and some light comes through.
Right: The top polarizer has its axis perpendicular to the bottom polarizer, and the light is blocked.

more of one polarization than the other. When the sun is overhead, the scattered light is mostly horizontal-polarized, parallel to the horizon in every direction. This selective polarization occurs because of the transverse nature of light: the incoming light is unpolarized, shown in Fig. 6 by the red and green waveforms. The scattered light, when viewed at 90˚ to the sun (along the horizon) has much more horizontal-polarized light, since the vertical polarization is along the direction in which light travels. The scattered light is therefore more horizontal-polarized.

To block the large amount of horizontal-polarized light, the transmission axes of sunglasses are set vertical. Some vertical-polarized light is produced by multiple scattering, but the blinding glare of the horizontal-polarized light is removed. Check it out by removing your polarized sunglasses, and rotating them by 90˚.

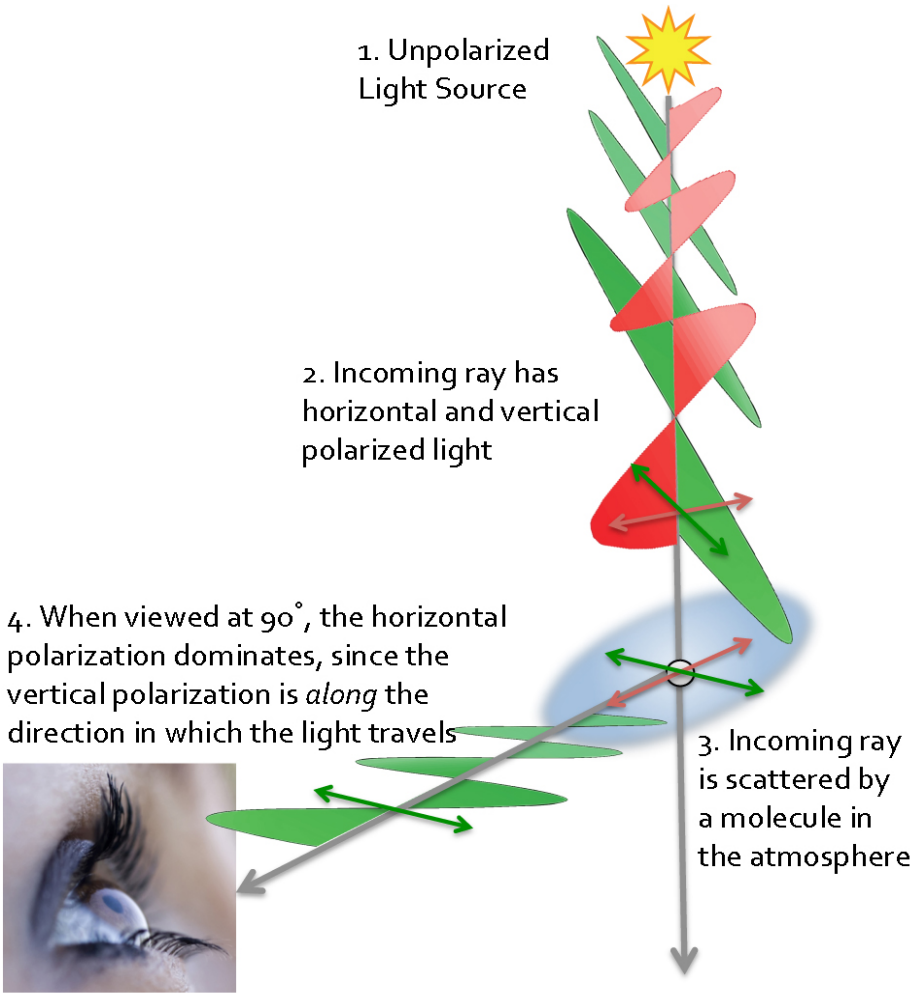


Fig. 6. Scattering from light when the sun is overhead.

At other times during the day, the polarization of the sky changes. Skylight is most strongly polarized 90˚ from the position of the sun. At sunrise or sunset, the greatest amount of polarization is close to the North-South line, with vertical-polarized light being stronger. Check it out by looking through your polarized sunglasses – remember to rotate them to see the effect.

The Polariscope

Sometimes it is hard to tell the difference in the brightness of the sky when you rotate your polarized sunglasses, because your eyes need to remember how dark the sky looked as you rotated the sunglasses. One way around this problem is to use a polariscope. A polariscope is a device where one section allows, say, vertically polarized light to come through, while another section of the same device allows horizontally polarized light to come through, so you can compare the brightness of the two polarizations side-by side.

A cheap polariscope can be constructed with a polarizing sheet and a piece of scotch tape. A lens from a (discarded) pair of polarized sunglasses will work. Stick the scotch tape at 45˚ to the vertical axis of the polarizer. Look at the sky through this modified polarizer (rotate as needed) and you can discern the contrast between the vertical and horizontal polarizations of skylight. Be sure to look along different directions, and at different times of the day. A place with an unobstructed view of the whole sky is best. I like to find a hilly spot without trees close by.

Fig 7 shows the sky along different directions through a homemade polariscope. The photographs were taken at about 11 am CDT in early August, and combined into a panorama.

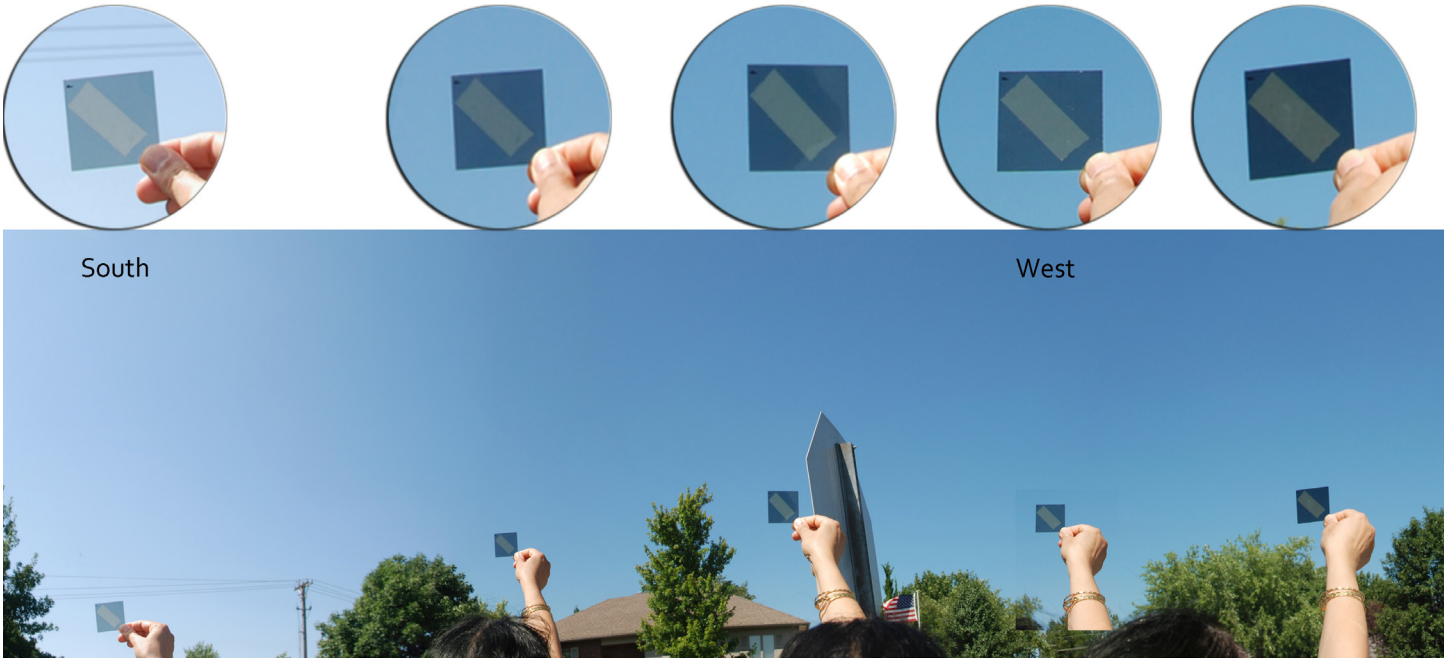


Figure 7. A panorama constructed from several images of a late morning sky in August. The home-made polariscope is held facing several different directions. Magnified images of the polariscope are shown above.
The difference between the brightness of horizontally and vertically polarized light is seen in the polariscope. The square polarizer is held with its transmission axis vertical, so that horizontally polarized light is blocked. When the background is darkest, the amount of horizontally polarized light is largest. Note that the amount of horizontally polarized light is most when looking a little north of west, 90˚ from the position of the sun. The ratio of horizontal to vertical polarized light is least when the polariscope is held facing South. My thanks to Uma Srinath for being the hand-model.

Teachers Growing Through Reflective Conversations

Sara Torres, Coach-Mentor Coordinator

ATIME for Physics First in Missouri has created a multi-faceted support system to assist teachers in implementing change in content and pedagogy. An important facet of the teacher support system has been the face-to-face coaching and online mentoring. The primary function of the coaches and mentors is to help teachers reflect upon their lessons and discuss student learning. In addition, they discuss concerns and/or needs regarding the lesson, as well as their classroom and implementation needs, including content, classroom management and pedagogy.

Each year, the support that the coaches and mentors provide has decreased in the number of meetings; however, the depth of those meetings has increased. During the first year that the teachers taught the curriculum, conversations that took place were at the surface level regarding teaching and learning. The teachers discussed how the equipment was working (or not) and how the lesson that they taught differed from what they experienced during the summer academy.

As the years progressed and the teachers have had multiple opportunities to teach the curriculum, the conversations have deepened in regards to the learning that occurred in their classroom. Teachers now reflect upon which students learned the objective for the day/lesson and which students struggled. More importantly, the teachers reflect upon ways to support those students that are struggling and how to challenge those that "got it." In education terms, we call this differentiation. The coaches and mentors utilize Cognitive Coaching techniques during their monthly conversations to help teachers take action toward their goals while simultaneously helping them develop expertise in planning, reflecting, problem solving, and decision-making.[1] Through these conversations, the project has seen the teacher support system provide unexpected successes of connecting teachers to resources and guiding them to share their expertise with others.

This process of reflection with a mentor was captured in a mentee's blog which stated:

Each month, we are required to fill out a reflection form and then discuss it with our mentor. Initially I was skeptical and didn't really see what benefit PF or I would glean from this exercise. However, Sara Torres said something in one of our meetings that really struck a chord with me- teachers are so busy, they never have time to reflect or think about their lesson. Even more importantly, they never have opportunity to reflect on how their students responded to that lesson. At that point, I realized that the reflection was for me! Each month, I choose what I felt was my least successful (worst class) of the day. I get time to analyze it and talk it out, figure out the nuts and bolts of why the class seemed challenging. When I take the time to sit and actually type out the on-goings, I discover things that never would have been on my radar before because I never had the time to pause and see it. Many times, I realize the class wasn't as bad as I thought and determine the cause of my challenge. Even better, I develop solutions to help both me and my students.[2]

It is not important to know the "answer" when coaching/mentoring teachers; it is more important to listen, question, paraphrase, probe and guide teachers to available resources that will enable them to be self-empowering. The coaches and online mentors in the project have seen teachers become more resourceful, informed and skillful professionals. Teachers are becoming reflective leaders in teaching Freshman Physics.

References:

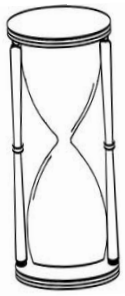
1. Costa, A. L. & Garmston, R.J. (2002). Cognitive Coaching: A Foundation for Renaissance Schools, 2nd Edition. (p. 13).Christopher-Gordon Publishers, Inc .Massachusetts.

2. Dweik, Cathy (2012). Physics First Blog.

Brain Benders

Dorina Kosztin, Dept. of Physics & Astronomy, University of Missouri

Hourglass on a balance

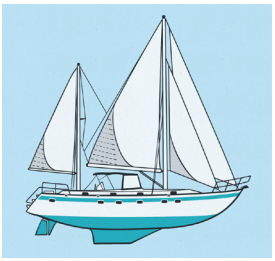


An hourglass is being weighed on a sensitive balance, first when all the sand is in the lower chamber, and then after the timer is turned over and the sand is falling. Will the balance show the same weight in both cases?

Balancing an upright stick

Generally speaking, bodies with low center of gravity are more stable than those with high. For example, a stub of a pencil can be stood on its flat end very easily, but it is much harder to stand a long stick on its flat end. Paradoxically, however, a long stick with its higher center of gravity is much easier to balance on the tip of a finger than a short pencil. Why?

Sailing in Calm Air!



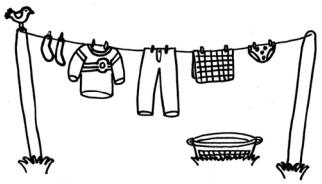
Suppose you are adrift in a sailboat on a river and the air is absolutely calm everywhere. The river is flowing at 4 knots, but you wish to reach your dock downstream in the least amount of time. Should you raise the sail or leave it? Will there be a difference?

Child with a balloon in a car

Inside a moving automobile, a child holds a helium balloon by a string. All the windows are closed. What will happen to the balloon as the car makes a right turn?

The laundry line revealed

Why does laundry hung on a clothesline dry from the top down?



Answers to April 2013 Brain Benders

The floating hour glass

An hourglass floats at the top of a closed cylinder that is filled with a clear liquid. The cylinder's inside diameter is just large enough to allow the hour glass to move unhindered up and down the tube. When the device is turned over, the hour glass remains at the bottom until about half the sand has fallen into the bottom compartment. The hour glass then slowly rises to the top. What is the paradox? What is the physics behind what happens?

Answer: The paradox arises because the buoyant force (and weight) should be the same at all times when the hourglass is totally submerged, but the behavior seems to contradict this statement. When the unit is turned over and the hour glass is inverted at the bottom, its slight tipping angle pushes its glass against the glass cylinder where the contact friction and the surface tension of the water prevent upward motion. When enough sand has fallen to the bottom of the hourglass, the torque that tips the hourglass is reduced significantly. Then the upward buoyant force becomes greater than the opposing forces – weight, contact friction, and surface tension – and up it goes!

Tire pressure

The pressurized air inside an automobile tire supports the weight of the car, yes? To check this idea, you first measure the tire pressure when the tire supports its share of the weight. Then you jack up the car until the tire no longer touches the road. You measure the air pressure again. Will there be any difference between the two measurements?

Answer: The tire pressure will be nearly the same in both cases. Even though the tire volumes are different in the two cases, this difference is small. The air pressure is slightly more when the tire helps support the weight of the car. The stiff tire sidewall actually provides much of the support for the car.

Sound in a tube

How does a sound wave traveling down a tube get reflected from its open end, from nothing?

Answer: A sound wave (or any wave) is partly reflected, partly transmitted and partly absorbed when the wave encounters a change in resistance to its movement. A sound wave moving inside an open tube will be partially reflected. A compression region at the open end will expand outward, thus creating a deficit of pressure – a rarefaction. Surrounding air gets into this region to build up a compression region moving back into the tube. One can envision the opposite effect when a rarefaction reaches the open end of the tube.

Which is the magnet?

The only difference between two steel bars is that one is a permanent magnet and the other is unmagnetized. Without using any equipment, how can you tell which is which?

Answer: Place the two magnets as shown. If the top of the T is the permanent magnet, there will be no attraction between them.

KUDOS

Deborah Hanuscin received notice of an award by the National Science Foundation of a $2.6 million grant (2013-17) for preparation of elementary teachers in the physical sciences. The title of the project is "QuEST: Quality Elementary Science Teaching." Congratulations, Debi!

Meera Chandrasekhar, Curators' Teaching Professor of Physics, has been selected as one of three finalists for Baylor University's 2014 Robert Foster Cherry Award for Great Teaching. Presented to an individual for exceptional teaching, this national award comes with a monetary reward of $250,000. The winning professor will be announced in spring 2014.

"This is a great honor," says Chandrasekhar. "I feel like this is a great way to talk about the importance of teaching on a national level."

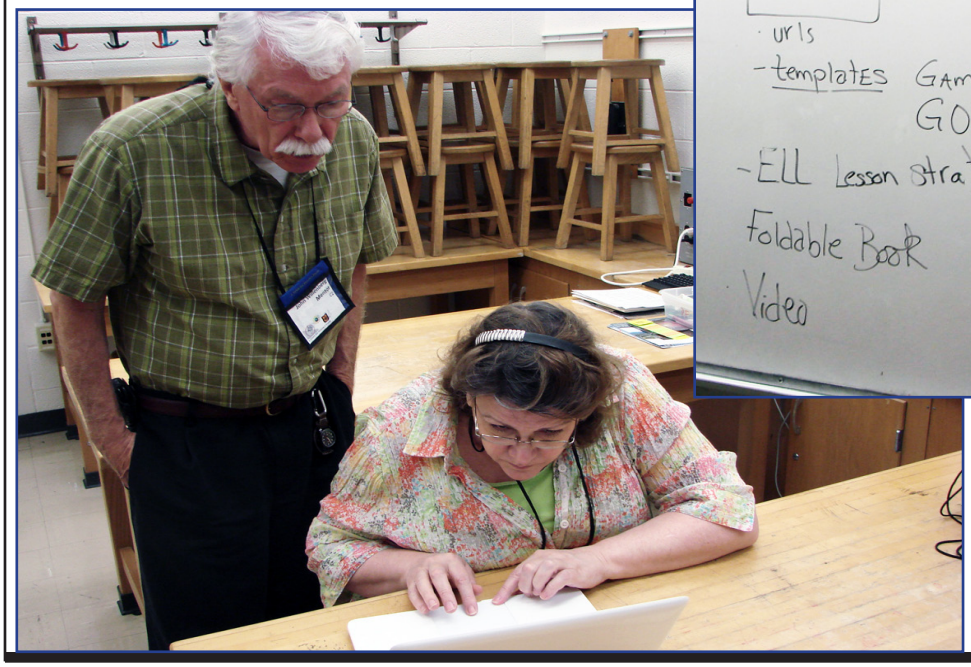
As a finalist, she will receive a $15,000 prize, and the MU physics department will receive $10,000 to foster the development of teaching skills. Chandrasekhar will present a series of lectures at Baylor during fall 2013 as well as a Cherry Award lecture on the MU campus on September 14. The eventual winner of the award will receive $250,000, an additional $25,000 for his or her home department, and he or she will teach in residence at Baylor during fall 2014 or spring 2015.

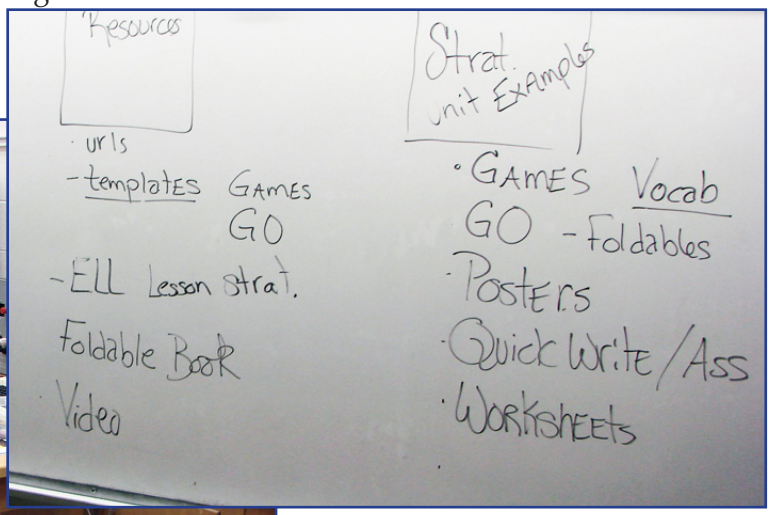
The Cherry Award was created by Baylor alumnus Robert Foster Cherry. The award was designed to honor great teachers and to stimulate discussion about the value of teaching and to encourage departments and institutions to value their own great teachers. Cherry had a deep appreciation for how his life had been changed by significant teachers, and he wanted to recognize other great teachers and bring them into contact with Baylor students.

Individuals are chosen for the award based on their proven records as extraordinary teachers with positive, inspiring, and long-lasting effects on students, along with their records of distinguished scholarship. To see the entire article, go to http://physics.missouri.edu/meera-chandrasekhar-finalist-cherry-award/

Laura Zinszer, a C2 Fellow and recipient of last year's Science Teacher of the Year Award from STOM, passed the Praxis in summer 2013.

Christina Brands, a C2 Fellow, passed the Praxis in summer 2013. She says, "Huge thanks to Dorina, Karen, Meera and my summer study partners, Kevin and Christy for all their help!!"





Above: The planning board used by Eldonna Rose and Sheryl Height-Madden as they created resources for differentiated learning to enrich the Physics First curriculum.
Left: Mentor John Willenberg and Fellow Eldonna Rose.

In Memory of John Dedrick

1949- 2013

The A TIME for Physics First team, faculty and Fellows express sincere condolences to the family of John Dedrick upon his passing this past month. John was an ardent participant in both the previous and current Physics First project. Here are a few memories that we would like to share:

John Dedrick with colleagues during A TIME for Physics First Academies, 2007-2011.

Joan Twillman: John and I were working out a deal for the college kid who was my former student and a current Science Olympiad judge to visit his North Kansas City team to give them hints on experimental design from the viewpoint of a young adult. That was typical of John: he was always collecting facts, techniques, and even people that could help his students go a little farther or enjoy the process a bit more. I am going to miss the attitude, the comfortable style, the enthusiasm, the practicality, and the way to figure things out that was John.

Glenn Owens: The first summer that I met John, he demonstrated a device made of cardstock, that could be used to determine one's latitude on the earth. It was quite simple and straightforward, but when he explained it, it was fascinating...and everybody wanted one. I am sure that's the way he was in his classroom too. He had a way of motivating people and he could relate to them. When he felt that a program or policy was not working, he offered constructive criticism and worked hard to fix problems. To other teachers, he was a constant source of information and inspiration. He was older than most beginning teachers, but he always had a child-like expression on his face when he was talking. I am truly saddened by his passing. It was an honor to have known him.

Doug Steinhoff: I loved being around John. He had a smile on his face every day I saw him for the last eight years. I loved talking baseball with him every day we met. He'd start off with how bad the Cardinals were and how good the Royals were and his hopes that the Royals would finally break through their quest for a pennant. He was a hopeless fanatic. He talked about his

time at the lake taking the grandkids out on a boat ride, or fishing from the dock, and how much he enjoyed his time there. John was as friendly as any person I've ever met, which is why it was so easy for him to have so many friends. I would occasionally meet him on the MU track while he was walking laps and we'd just talk about what's going on in our lives. I asked him several times why he was still teaching knowing that he could have retired earlier and his answer always stood out to me. He said that as long as he enjoys what he is doing, he didn't see a need to retire. He was very excited to teach physics in a different, more conceptual way, a way that should reach more of his lower ability students. You don't find that kind of passion in many people today, and especially in teachers who have been around a while. I think that is just one of the things that really sets John apart from the rest. I had looked forward to going down to the lake some summer and just hanging out with John on his deck and sharing a beer while we talked about all the things right and wrong with the world. When my time comes, I hope I get that chance.

From the Sakai Chat Room:

Linda Kralina; Today our hearts are filled with sadness at the passing of our friend and colleague, John Dedrick. Words seem inadequate to express our sorrow at this time. May his joy for teaching and passion for physics fuel your efforts this coming year.

Linda Kralina; John Gardner states that much education today is monumentally ineffective. All too often we are giving young people cut flowers when we should be teaching them to grow their own plants. John Dedrick set up his classrooms like greenhouses, to encourage all learners to grow their own miracles. We will miss you, John and extend our deepest sympathy to your family. May good memories ease their sorrow on your passing.

Joan Twillman; … I miss John. He was as much a presence as a teacher, mentor, and science coach. My sympathies to his family and to our community- two of the groups that he valued highly.

John Willenberg; I loved when the other John gave me a hard time...it made me feel special that he would take the time to have fun with me. I am sure he made his students feel the same.

Do not stand at my grave and weep.
I am not there - I do not sleep.
I am the thousand winds that blow,
I am the diamond glints in snow,
I am the sunlight on ripened grain,
I am the gentle autumn rain.
As you awake with morning's hush
I am the swift-up-flinging rush
Of quiet birds in circling flight.
Do not stand at my grave and cry,
I am not there - I did not die.

Mary Frye, 1932

The North Kansas City Schools Education Foundation is accepting contributions to its scholarship fund in John's name. To contribute, mail checks to Education Foundation, North Kansas City Schools, 2000 N.E. 46th St., Kansas City, MO 64116-2042.

Make sure to add "John Dedrick" in the memo line of your check.

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
2012 summer academy:
Cohort 1: June 4-June 15 2012
Cohort 2: June 4 - June 29, 2012
Math Teacher academy: June 4-8
Adminstrators academy: June 7-8, 2012
Contact:

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Further infomation: www.physicsfirstmo.org

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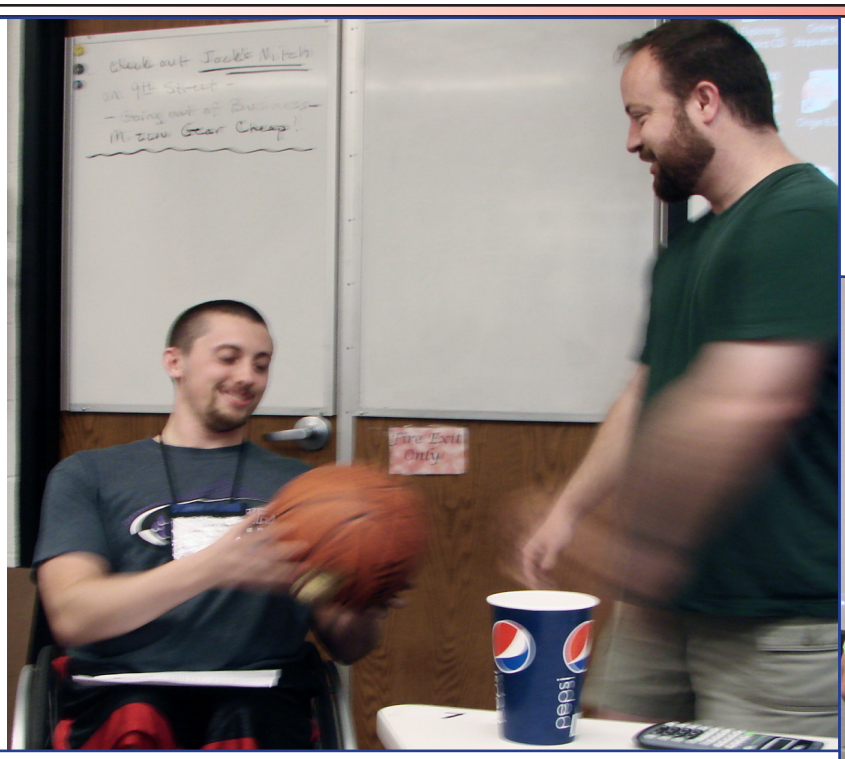

ACTION SHOT - John Gilbert catches the basketball passed by Matt Boldt. The gift ball was signed by the Physics First team in honor of John's selection on the 2013 USA Men's National Team that competed in the Sixth America's Cup, Wheelchair Basketball in Bogota, Colombia in August. Team USA WON the tournament and brought home the gold! The team now qualifies for the 2014 World Championship.

Laura Zinszer and Ann Neubauer, the BAM-WHO KNEW team, deliver their presentation at the C2 academy in June 2013.

From:

A TIME for Physics First

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