



A TIME for Physics First

A TIME FOR PHYSICS FIRST

ACADEMY FOR TEACHERS - INQUIRY AND MODELING EXPERIENCES
FOR **PHYSICS FIRST**
For 9th grade science teachers

NEWSLETTER: Vol 1, No. 1, April 2007

FOCUS ON PHYSICS FIRST

WHAT IS "A TIME FOR PHYSICS FIRST?"

"A TIME for Physics First" is funded by the Missouri Department of Elementary and Secondary Education through Math-Science Partnership funds provided by the US Department of Education. The project's immediate (3-year) goal is the design and implementation of a professional development curriculum resulting in a yearlong physics course in 9th grade classrooms (Physics First). The project's long-term goals are to increase the proficiency of students in science as evidenced by MAP or other standardized scores, increase the number of highly qualified physics / physical science teachers, and to increase students' interest and success in science / engineering degrees.

With these goals in mind, the Physics First project has created a partnership that includes several school districts, institutions of higher education, state and regional educational centers and associations, businesses and non-profits. Participants from the original partner schools, as well as from other districts in Missouri are eligible for the program.

WHY PHYSICS FIRST?

Physics First is a sequence change spearheaded by Leon M. Lederman, the winner of the 1988 Nobel Prize in Physics. The rationale for Physics First is stated both on the Project ARISE (American Renaissance in Science Education) website, and by the American Association of Physics Teachers (AAPT):

"Today's society relies more upon science and technology, so **more** students need to learn **more** science. This is crucial to both employment and to the exercise of responsible citizenship. A physics-chemistry-biology sequence leads the student from the simple to the complex, an approach in harmony with current understanding of how the brain learns.

Understanding modern biology, for example the function of DNA, requires a background in chemistry, physics, and mathematics.

The Partnership

School Districts

- Columbia 93; Lead School District
- Carthage R-9
- Ferguson-Florissant R-2
- Francis Howell R-3
- Hazelwood
- Hickman Mills C-1
- Archbishop O'Hara High School
- Mehlville R-9
- Morgan R-2
- Perry County 32
- St. Vincent School
- Webb City R-7

Institutions of Higher Education (IHE)

- University of Missouri-Columbia, Lead IHE
- Missouri State University, Springfield

State and Regional Centers and Associations

- Heart of Missouri Regional Professional Development Center
- Ozark Rural Systemic Initiative
- St. Louis Regional Professional Development Center

Businesses and Non-Profits

- Columbia Water and Light (CWL)

Moreover, chemistry is based upon the charge structure of atoms and the forces between these charges, concepts learned in physics.

A largely conceptual physics course starts with concrete experiences from students' daily lives, e.g., from sports, transportation and safety. Investigating the plausibility of popular science fiction may add to the appeal.

Today, algebra classes start earlier, often in eighth grade, and support the earlier study of physics and chemistry. At the same time, real-world science applications can motivate students to learn many more mathematical tools."

WHAT ARE THE MAIN ACTIVITIES OF A TIME FOR PHYSICS FIRST?

- Writing and Analysis teams develop Physics First curriculum with focus on content utilizing research-based inquiry and modeling methods. The Writing Team meets monthly, and with the Analysis Team regularly, to construct Units 5-9 for Academy 2007.
- Curriculum Committee and Advisory Board for oversight. Curriculum Committee meetings were held in August, October and December of '06, and January, March, and April 2007. The Advisory Board meets twice annually; with the next in April '07
- Annual 3-week long professional development Academy for 9th grade teachers held in 2006, 2007 and 2008. In 2007, the dates are June 11-29.
- A second cohort, the Protégés, will attend for 4 weeks each in 2007 and 2008. Their Academy is scheduled for June 4-29, 2007.
- All participants attend four day-long follow-up visits during the academic year.
- Monthly visits to PF classrooms by Coach-Mentors
- Professional learning teams (PLTs) for academic year collaboration
- Support for attendance at regional and national conferences
- Evaluation of all aspects related to objectives.

~ **Meera Chandrasekhar** ~

PRESENTING

Several Physics First participants have taken part in presentations this year at professional conferences:

Sandy Letterman, Willow Springs High School, co-presented "A TIME for Physics First" in February at Interface, an annual math/science conference hosted by MO DESE and at the National Science Teachers Association national conference in St. Louis in March.

Casey Brennan, **Crystal Gholson** and **Dustin Pearce** of Perryville High School, **Andy Graf** of St. Vincent's High School in Perryville and **Pam Didur**, **Steve McMullin** and **Marsha Tyson**, of Columbia's Oakland Junior High School co-presented "Lesson-Study in the Physics First Classroom" at the NSTA national conference in St. Louis.

Congratulations to all, and thank you from the Physics First team!

WHO MAKES UP THE PROJECT STAFF?

- **Sara Torres**, Science Coordinator, Columbia Public Schools (Lead District PI, Project Director)
- **Meera Chandrasekhar**, Curators' Teaching Professor of Physics, University of Missouri, Columbia (Lead Institute of Higher Education PI)
- **Dorina Kosztin**, Resident Instruction Associate Professor of Physics, University of Missouri, Columbia
- **Mark Volkmann**, Associate Professor of Learning, Teaching & Curriculum, University of Missouri, Columbia
- **James Tarr**, Associate Professor of Learning, Teaching & Curriculum, University of Missouri, Columbia
- **Mani K. Manivannan**, Associate Professor of Physics, Missouri State University, Springfield
- **Sarah Hill**, Program Coordinator, University of Missouri, Columbia
- **Molly Delgado**, Bookkeeper, Columbia Public Schools

FOCUS ON DESE

In February 2007, the State Board of Education accepted the recommendation to replace high school level MAP assessments with end-of-course exams in selected core courses. End-of-course assessments for Algebra I, English II and Biology will be given during the 2008-09 school year. Additionally, DESE intends to create similar assessments in Government, American History, Geometry, English I, Chemistry and Physics. It is proposed that these additional assessments be available no later than Spring of 2010. However, development of Chemistry and Physics concept assessments will depend upon funding.

To develop end-of-course assessments, DESE will ask a team of teachers from across the state to help cluster the Grade Level Expectations (GLEs) by course, identifying "Focal GLEs" within the clusters for test development and discussion of course descriptions and any necessary changes to certification.

~ **Sara Torres** ~

From the Evaluators

By this time in the school year you are counting down the months – much like the students!

Your teachers are completing their first year with the *A Time for Physics First* project. They have been participating in the evaluation component required by DESE to show the effect of the project on their content knowledge acquisition and their students' achievement in the physical sciences.

Sometimes the evaluation process seems like an added burden to teachers who are trying to conform to project requirements to implement a new curriculum and to provide data to external evaluators. Your role in supporting the evaluation is critical. Your recognition of the extra class time for testing students and your support of returning evaluation documents from the teacher to the evaluators insures that the project can be accurately represented in reports to DESE. These data are also critical in helping the project focus more closely on the needs of your teachers and students as the project continues.

We appreciate your teachers' cooperation and look forward to working with them throughout the project. We are doubly appreciative of your efforts as you support your Physics First teachers as they transition to a new curriculum.

If you have questions regarding the evaluation process, please contact us by phone at (314) 353-8905 or by email: Keith Murray at keithsmurray@mahenryconsulting.com or Marty Henry at mahenry@mahenryconsulting.com

Food for Thought

Seven Physics First teachers presented their Lesson Study projects at the annual conference of the National Science Teachers Association in St. Louis on April 1, 2007. Those presenting were Pam Didur, Steve McMullin and Marsha Tyson from Oakland Junior High School in Columbia and Casey Brennan, Crystal Gholson and Dustin Pearce from Perryville High School in Perryville; and Andy Graf from St. Vincent High School in Perryville. They did a great job and their projects were well received by the audience.

Lesson study is a graduate credit activity that all Physics First teachers have been assigned this semester. Like the Columbia and Perryville teachers, all Physics First participants join Professional Learning Teams (PLTs). The primary task of the PLT is to select a classroom lesson from the Physics First curriculum, decide how to best revise the lesson, and take turns teaching it. Between each teaching turn, the PLT meets to discuss the strengths and weaknesses of the lesson. This

Coming together is a beginning.
Keeping together is progress.
Working together is success.

~ Henry Ford ~

dialog gives teachers the opportunity to share ideas, strategies and any concerns, in order to improve the lesson. Lesson Study provides an environment in which teachers can share, reflect, criticize and learn about teaching from one another.

In the next newsletter, the lesson study process will be described in greater detail. In the meantime, we encourage you to talk to the Physics First teachers in your building about Lesson Study. Find out what physics lesson they selected and what they learned from the process of teaching, discussing and reflecting. Physics First teachers will be completing two additional lesson study projects during the next two years of their involvement with the Physics First program. We look forward to showing off more Lesson Study projects at the National Science Teachers Association meetings in Boston in March 2008 and in New Orleans, in March 2009.

~ **Mark J. Volkmann** ~

FORUM: Coach Mentors

One of the most comprehensive aspects of the Physics First grant program is the addition of the Coach Mentor to the support system. Coach Mentors are experienced physics teachers assigned to a small group of three or four teachers, usually within the same building, district or city, or sometimes, just closest proximity. Each group of teachers becomes a Professional Learning Team (PLT) that works together on a lesson study during the academic school year. Each Coach Mentor is assigned two or three PLTs. These veteran teachers serve several functions to provide on-going substantiation for the program's budding physics teachers.

Coach Mentors attend the summer academies with their teams, to learn the specific curriculum and accompanying pedagogy used for implementation. Coach Mentors also attend special sessions on guiding their teams and mentoring adults. They work with their teams to help in problem-solving, brain-storming and team-building.

During the academic year, Coach Mentors make monthly visits to each teacher's classroom. It is this role that teachers tell us is the most helpful, having their own personal physics expert visit regularly. This program is unique in that teachers do not simply attend a summer program and hope for successful implementation upon return to their classrooms. Coach Mentors come to them on a regular basis to help and provide encouragement. During these monthly visits, teachers can discuss the details of how things

are going at their school and in their own classroom. Discussions range from how experiments are working, problems with equipment, students' misconceptions, questions or concerns about concepts or curriculum, school issues, and updates from the program. The clarification of content, personal encouragement and open exchange give teachers the wherewithal and confidence to continue teaching the Physics First curriculum, knowing that their Coach Mentor will be there for support.

Coach Mentors also provide a one-on-one liaison between the school district and the Physics First grant program. They establish contact with those individual school administrators who oversee the respective PF teacher in the building. Regular monthly visits to the school help build trust and confidence in the program and show administrators that they have regular and easy access for questions about the implementation of the curriculum or pedagogy.

Another function of the Coach Mentor is to assist and support the PLT in lesson study during the academic year. While not directly involved in teaching the lesson for the study, the Coach Mentor once again, is there to meet with teachers, to answer or find answers for their questions, and offer support and encouragement. Coach Mentors 'pick up the slack' when things seem overwhelming to the teachers, suggesting resources or alternatives, brainstorming solutions, or just offering words of encouragement.

Coach Mentors participate in biweekly teleconferences to update the program's leadership team on the current status of their PLTs,

related to implementation of the program and lesson study. This keeps the leadership team abreast of concerns or problems as they arise. These matters can then be addressed before becoming insurmountable obstacles for everyone. These regular conference calls also show Coach Mentors how other teams are progressing as well as new developments and updates in the overall program. Updates are then shared with their teachers in the next monthly visit. Some Coach Mentors also serve on curriculum and advisory committees for the Physics First grant program.

The Coach Mentors' final function is to welcome Protege applicants and introduce them to the program and respective teaching teams. This adds a personal touch and addresses individual concerns about the program and its purpose before attending the annual Summer Academy. Proteges can then meet and become acquainted with members with whom they will soon be working.

Helping teachers grow and develop in their knowledge and implementation of physics principles builds friendships and is personally gratifying. Coach Mentors receive encouragement and support in their roles through regular conference calls and special sessions at the summer academies and quarterly meetings. The leadership team is always available by e-mail or phone, readily accessible to Coach Mentors when questions or difficulties arise with or in their PLTs. Being a Coach Mentor is a rewarding position and serves a vital role in the successful implementation of the Physics First grant program.

~ Linda M. Kralina, M.Ed ~

News from NKCS D

In 2005, secondary science teachers from our three high schools gathered to evaluate course pathways in place at that time. A careful review of student achievement data showed that our students were struggling greatly and failing to acquire necessary Missouri Grade Level Expectations in physics.

This team of teachers worked in collaboration with DESE to investigate appropriate ways to address concerns with student achievement in this area. After careful consideration of all information, the team recommended that the school district adopt a Physics First course pathway sequence (Physics followed by Chemistry followed by Biology) and the Physics First philosophy of teaching. Central Office Administration and the Board of Education embraced this recommendation and we have been off and running ever since!

As many of you know, the road to change can be bumpy. The challenges associated with changes in course pathway and teaching philosophy impact individual teaching belief systems, building cultures and belief systems, and building and district budgets. Driven by what is truly best for our students, our school district continues to face these challenges and work diligently to provide support as necessary and where needed.

~ **Rebecca Schauwecker** ~

Secondary Science Resource Coordinator, ACIS Department, North Kansas City School District

“Who dares to teach must never cease to learn.”

JOHN COTTON DANA

Summer Academy 2007

This year, our second academy is surely going to be an exciting one for the Physics First participants, faculty, staff and our new cohort, the Protégés.

Fifty-four participants plan to face the challenge once again, and will absorb the content and pedagogy of new units of physics to bring back to their 9th grade classrooms for the 2007-08 academic year. These pioneers have faced challenges this year, learning content new to many of them, pedagogy less familiar, with implementation sometimes difficult, but hopefully all worthwhile for their students. Their academy is scheduled for June 11-29, 2007.

Physics First faculty will consist once again of three teams: Dr. Meera Chandrasekhar (University of Missouri) with Dr. Dennis Nickelson (William Woods University), Dr. Dorina Kosztin, (University of Missouri) with Mr. Gabe De La Paz (Clayton School District), and Dr. Mani Manivannan (Missouri State University) with Mr. James Roble (Francis Howell Schools). The teaching team has met monthly this academic year to develop the curriculum for the summer academy. Content for the academy includes Two-dimensional Motion, Energy, Momentum, Astronomy and Electricity concepts. As before, it will provide many rich learning opportunities for participants.

The newest members of the Physics First team are 19 Protégés, all 9th grade science teachers from participating and new districts. This cohort will attend the 2007 academy in a separate classroom for four weeks, June 4-29, 2007. Content in their classroom includes that of Academy 2006 plus part of the Year 2 content. They will return for four weeks in June of 2008 as well.

As in 2006, the PF program has invited math teachers to attend the first week of the regular academy, June 11- 15, with their science teacher colleagues. We hope this will continue to foster further collaboration between math and science departments and provide support for implementation of the PF curriculum. District administrators are invited to attend the academy on June 18-19 to take part in classroom activities as well as meet with their colleagues from other participating districts. Applications for Math teachers and Administrators are available on the website.



Amy Campbell, Marsha Tyson and Steve McMullin explain their graph.

Casey Zahner and Ryan McCoy work on the Wheel Lab.



A Physics First Classroom during the Bubble Tube Lab.



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