SUPPORTING TEACHERS AND STUDENTS IN A TIME FOR PHYSICS FIRST

University of Missouri

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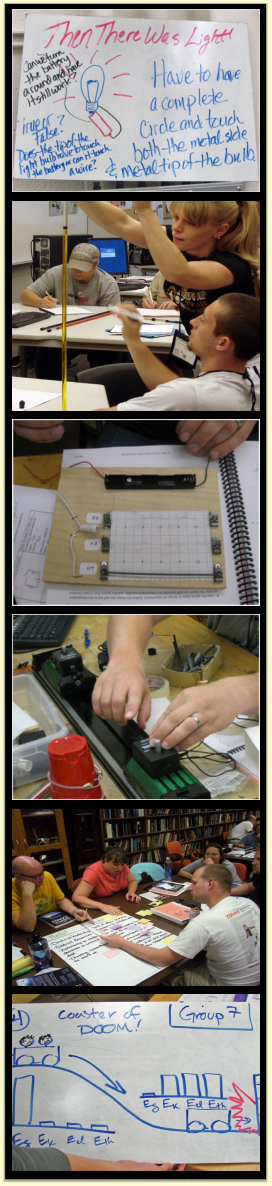
A TIME for PHYSICS FIRST
www.physicsfirstmo.org



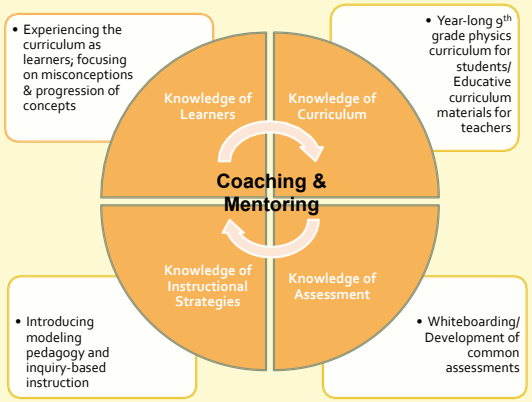
ABOUT THE PROGRAM

A TIME for Physics First is a partnership among the University of Missouri (MU), and 37 Core Partner school Districts. The vision of the project is to prepare Missouri's 9th grade science teachers to become intellectual leaders in the implementation of a yearlong freshman physics course. The goals of the project are to

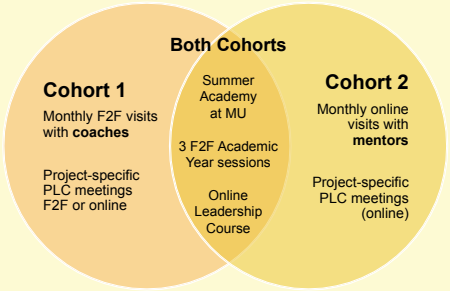
- Strengthen 9th grade science teachers' and their students' understanding of physics and the application of physics to the world around them.
- Create a solid base of knowledge for students' subsequent science coursework.
- Build a strong learning community among research faculty and high school teachers to enable year-round professional development.
- Create leaders who will become advocates for excellence in mathematics and science.
- Increase interest of students in future science coursework and toward their career choice.
- Provide PD through three years of summer academies and academic year support.

CONCEPTUAL FRAMEWORK & PD DESIGN

A strong grasp of subject matter is necessary, but not sufficient for effective teaching. In our program, we recognize that individualized support is necessary for teachers to translate what they learn into their classroom practice and develop robust **pedagogical content knowledge** for teaching physics. Coaching and mentoring are two forms of support that have empirical support. Recent work indicates that mentoring and coaching relationships may benefit from the use of technology. "Blended" or "hybrid" professional development models that couple both more traditional face-to-face activities with online interactions are becoming more increasingly common with the explosion of available technologies and platforms. In this project, we are interested in understanding the strengths and weaknesses of two different hybrid models in order to compare their relative effectiveness in supporting teachers in making a positive impact on student learning.



COHORT DESIGN



Ten coaches and mentors who are trained in Cognitive Coaching are part of the staff of the project. They attend summer academies with teachers, meet in person (coaches) or communicate online with teachers (mentors) on a monthly basis, and collaborate with a coach-mentor coordinator monthly. Coaches and Mentors are the project's eyes and ears in the field.

EVALUATION RESULTS

Random-selection, two-cohort, delayed-entry design:

Both Cohort 1 ("treatment") and Cohort 2 (comparison/not-yet participating) teachers and their students took pre/post physics content tests:

Test of Understanding Graphs-Kinematics (TUG-K) and Misconception Oriented Standards-based Assessment Resource for Teachers (MOSART)
Teachers: n = 53
Students tested: n = 1,433

Teachers, Summer 2011

Cohort	Test	N	Mean Difference	Standard Error of Difference	t	Sig (2-tailed)	Effect Size
1 2	TUG-K	28 25	5.15	0.88	5.84	0.000*	1.46
1 2	MOSART	28 25	0.65	0.59	1.09	0.277	NA

Pre/Post Content Physics Knowledge Gains for Students,2010-11

Within Groups

Cohort	Test	N	Mean Pretest	Mean Posttest	Mean Difference	sd	t	Sig (2-tailed)	Effect Size
1	TUG-K	675	3.1	6.5	3.4	4.04	21.98	.000*	0.85
	MOSART	660	8.3	9.1	0.75	3.01	6.34	.000*	0.25
2	TUG-K	758	3.2	4.5	1.3	3.89	9.21	.000*	0.33
	MOSART	734	7.6	8.2	0.58	3.21	4.89	.000*	0.18

Univariate analyses, general linear models, t-tests

PUBLICATIONS & PRESENTATIONS

- Chandrasekhar, M., Hanuscin, D., Rebello, C., Kosztin, D., & Sinha, S. (2011) Teacher professional development must come first for 'Physics First' to succeed. *Journal Educational Chronicle, 1*(2), 1-9.
- Rebello, C.M., Hanuscin, D., & Sinha, S. (2011) Leadership in freshman physics. *The Physics Teacher. 49*, 564-566.
- Hanuscin, D., Sinha, S., & Rebello, C. M. (2011, January). *Supporting the Development of Science Teacher Leaders – Where Do We Begin?* Paper presented at the annual meeting of the Association for Science Teacher Education. Minneapolis, MN.
- Hanuscin, D., Cheng, Y., Rebello, C.M., Sinha, S., & Muslu, N. (2012) *The Use of Blogging as a Tool to Support Teachers' Identity Development as Leaders.* Paper presented at the annual meeting of the National Association for Research on Science Teaching. Indianapolis, IN.
- Rebello, C.M., Cheng, Y., Sinha, S., & Hanuscin, D., (2012) *Exploring Ninth-Grade Science Teachers' Path of Leadership for Implementing Educational Reform Efforts: A Case Study.* Paper presented at the annual meeting of the National Association for Research on Science Teaching. Indianapolis, IN.

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