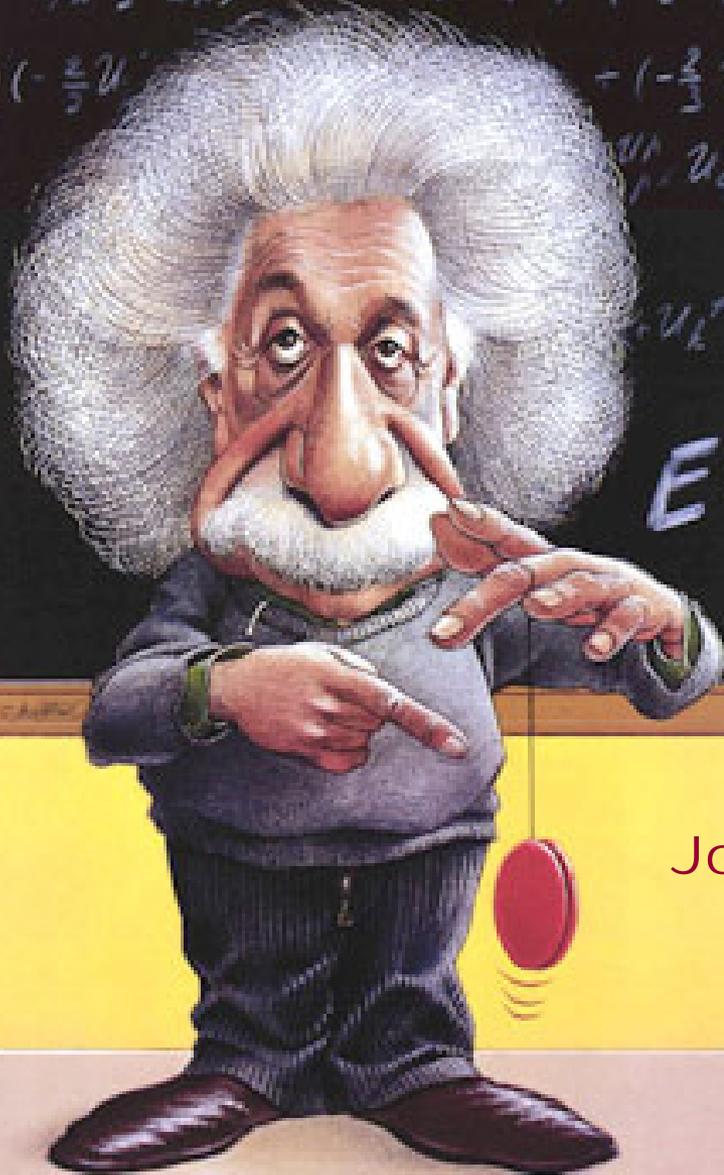


# Building Education Majors' Confidence for Teaching Physics

$$E = \underline{mc^2}$$

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# Physics Teaching and Learning

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- ***Knowing ≠ doing***
- Belief in one's ability to **understand** science and to **teach** science content are important predictors of how well one will actually teach science material (Schoon & Boone, 1998)
- ***Teaching self-efficacy*** has been found to be related to teacher motivation, job satisfaction, use of instructional strategies, and student achievement (see Klassen, Tze, Betts, & Gordon, 2011, for a review)

# Purpose of the Study

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- To examine the content-related and teaching efficacy beliefs of elementary and middle school education majors enrolled in a semester-long physics course designed for preservice teachers.

# Hypothesis

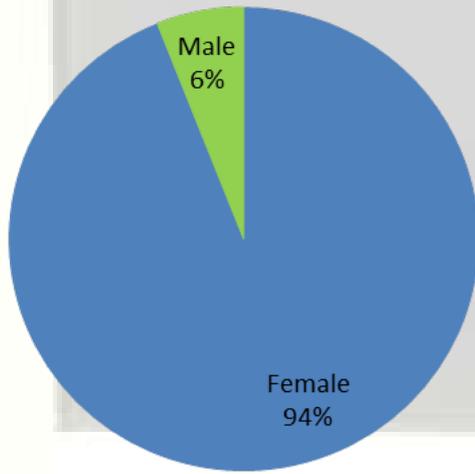
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- A physics course designed for preservice teachers would alter students' beliefs in their capabilities to do and to teach science.

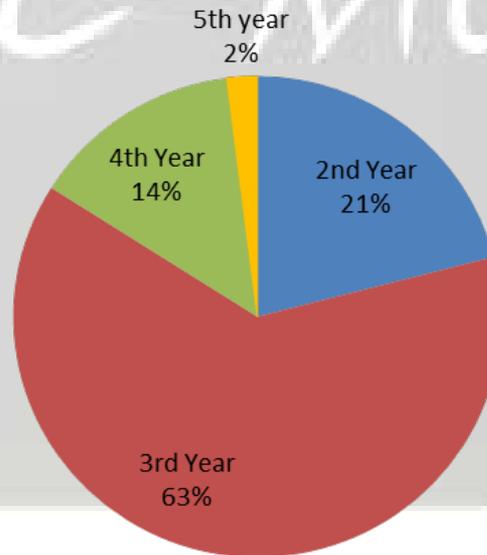
$$E=MC^2$$

# Participants

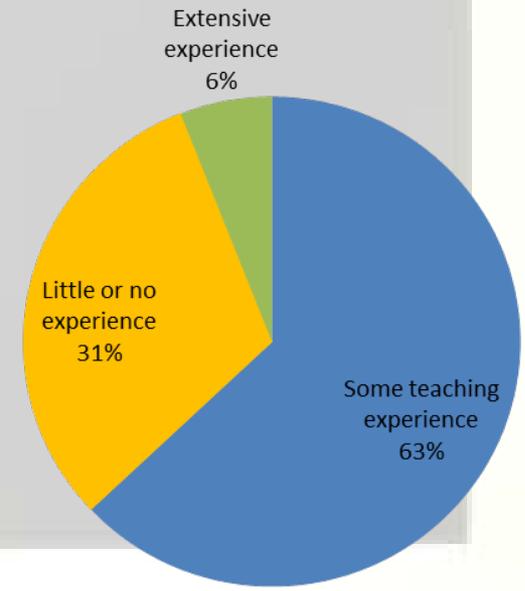
- 51 education majors from the University of Kentucky enrolled in two sections of a 100-level physics course for teachers
- Mostly 21-23 years of age



Gender Distribution



Year-Level Distribution



Teaching Experience Distribution

# Data Sources

- Demographic variables
- Two self-efficacy scales:
  - Physics Self-Efficacy Scale (19 items)
    - *“Please rate how certain you are that you can DO the following science-related tasks”*
    - *“I can explain what causes the seasons on Earth.”*
  - Physics Teaching Self-Efficacy Scale (19 items)
    - *“Please rate how certain you are that you could TEACH these science-related tasks if asked today.”*
    - *“I can teach students what causes the seasons on Earth”*
  - Each was measured on a 0-100 point scale from *not very certain to very certain*

# Data Sources

- Perceived importance of physics tasks
  - Please rate how important you think it is for your students (those you expect to teach) to do the following science-related tasks
- Perceived influence of class-related activities
  - Please indicate the degree to which the following (e.g., “keeping a notebook”) influenced your confidence in teaching science.
  - Scale ranged from *[Activity] made me feel much less confident [-50] to much more confident [+50]*

# Data Sources



# Design

SPRING 2011 SEMESTER

January

February

March

April

May

T1

Time 1

- Self-Efficacy in Doing Physics
- Self-Efficacy in Teaching Physics
- Perceived Importance of Physics Tasks

T2

Time 2

- Self-Efficacy in Doing Physics
- Self-Efficacy in Teaching Physics
- Perceived Importance of Physics Tasks
- Perceived Influence of Class-Related Activities

# Analyses

- Descriptive statistics and zero-order correlations
- Paired-samples  $t$  tests
  - Were SE difference scores different between content and teaching?
- One-way ANOVA and post-hoc  $t$  test
  - Were mean differences in SE related to teaching experience?
- Independent-samples  $t$  tests
  - Did SE changes differ between classes?

# Results

*Means, Standard Deviations, and Zero-Order Correlations for All Variables in the Study*

	M	SD	1	2	3	4
1. Age	21.67	4.55	-			
2. Completed Science Courses	3.18	1.94	.01	-		
3. Physics Self-Efficacy	82.69	10.88	-.01	.09	-	
4. Physics Teaching Self-Efficacy	82.17	11.94	.21	-.01	<b>.84*</b>	-
5. Perceived Importance	79.56	16.03	.06	.04	<b>.47*</b>	<b>.54*</b>

Note: Time 2 was used for the variables in the matrix.

\* $p < .01$ .

# Results

- Self-efficacy increased significantly
  - For doing physics:  $t(43) = -9.657$ ,  $p < .01$ ,  $d = 1.84$
  - For teaching physics:  $t(44) = -9.705$ ,  $p < .01$ ,  $d = 2.63$
- Both self-efficacy judgments:
  - Positively related to perceived importance
  - Unrelated to completed science courses, years in school, prior teaching experience

# Results

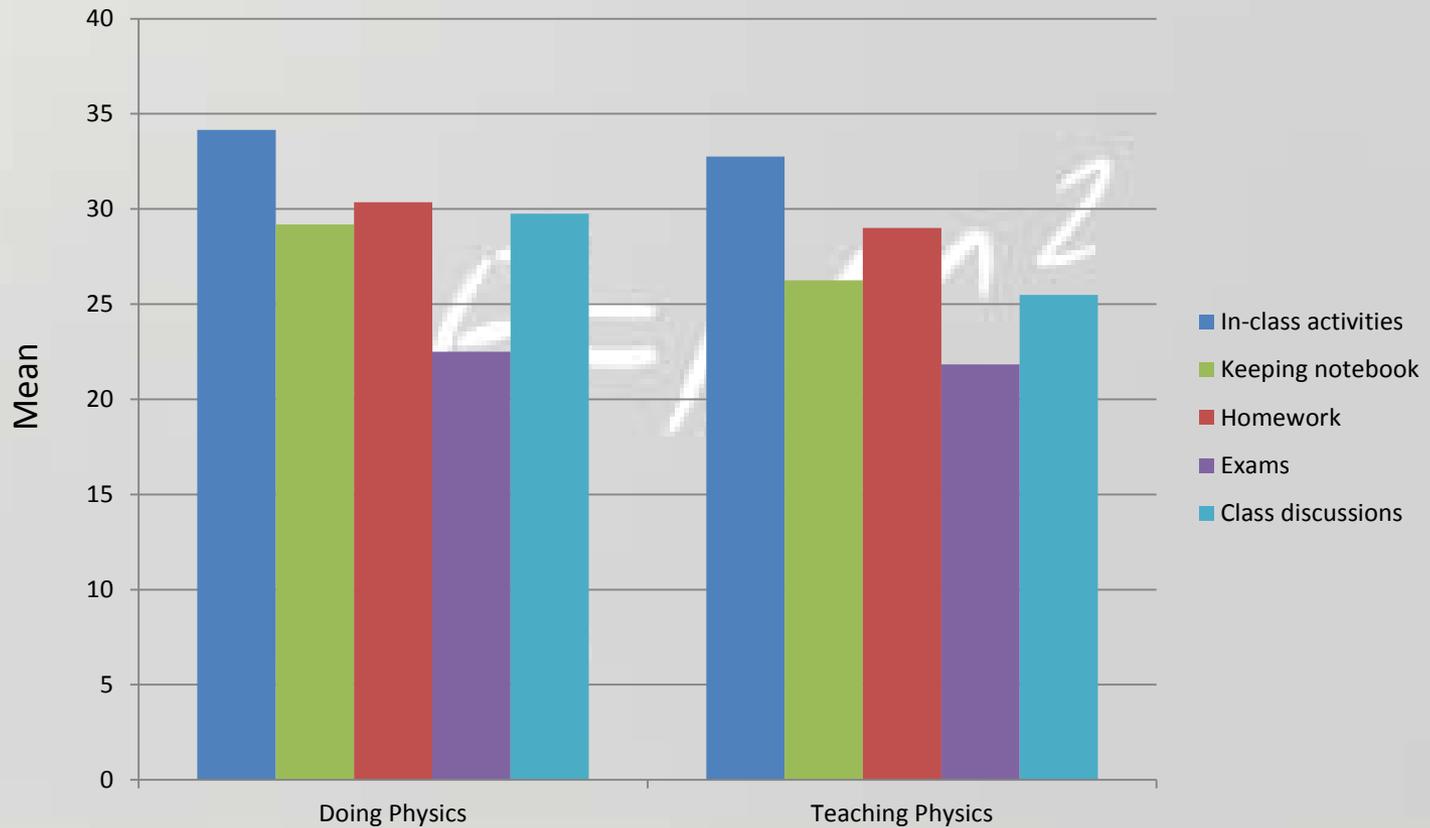


Figure 1. Means of perceived influence of class-related activities on doing and teaching physics.

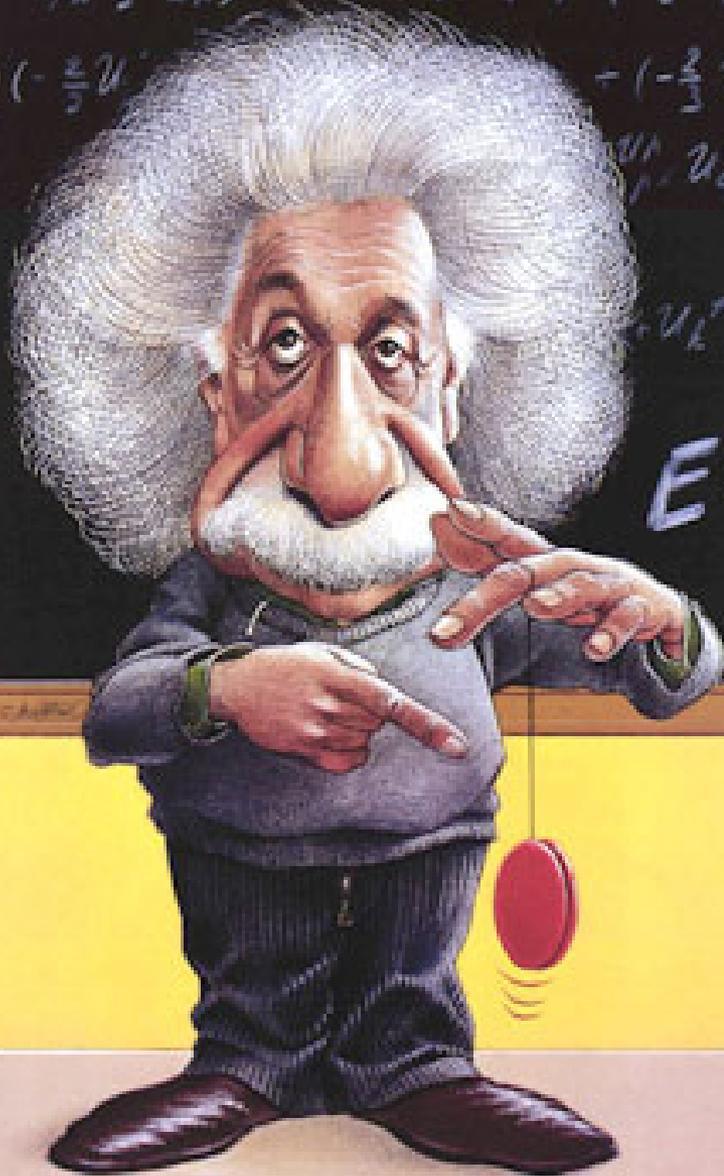
# Discussion & Significance

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- A physics course designed for teachers helped build confidence in doing and teaching physics
- Course experiences such as in-class activities help enhance both physics self-efficacy and physics teaching efficacy
- Being able to perform a physics task successfully might strengthen preservice teachers' beliefs that they can teach what they know and that the concepts they are teaching are important. This causal relationship should be tested.

# Future Directions

- Qualitative data from interviews
- Physics-for-teachers course versus lecture-based general physics course on preservice teachers' self-efficacy
- Classroom variables (e.g., teacher behaviors, time-on-task)
- Gender differences
- Include preservice high school teachers



Thank you!

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