



# Evaluation of the Physics and Astronomy New Faculty Workshop

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## Abstract

**Between 1996 and 2006, 759 new physics and astronomy faculty have participated in the New Faculty Workshop. This represents approximately 25% of all new physics and astronomy faculty in the US. The workshop is jointly administered by the American Association of Physics Teachers (AAPT), the American Astronomical Society (AAS) and the American Physical Society (APS) with funding from the National Science Foundation. The goal of the workshop is for participants to learn about new developments in physics and astronomy pedagogy and to integrate these ideas and materials into their instruction. During the spring of 2007 a web survey was administered to all former workshop participants as part of an evaluation of the impact of the New Faculty Workshop. This talk presents selected results from the survey.**

# Overview

1. Description of the New Faculty Workshop (NFW)
2. Why the NFW should not work
3. Evidence that the NFW does work
4. Possible reasons for success

# The New Faculty Workshop

Run by professional societies: AAPT, AAS, APS



Funded by NSF



## NFW Organizers and Advisory Committee:

Susana E. Deustua	Warren Hein
Robert Hilborn	Theodore Hodapp
Bernard Khoury	Kenneth Krane
Tim McKay	Laurie McNeil
Steven Turley	



# New Faculty Workshop

## Goals:

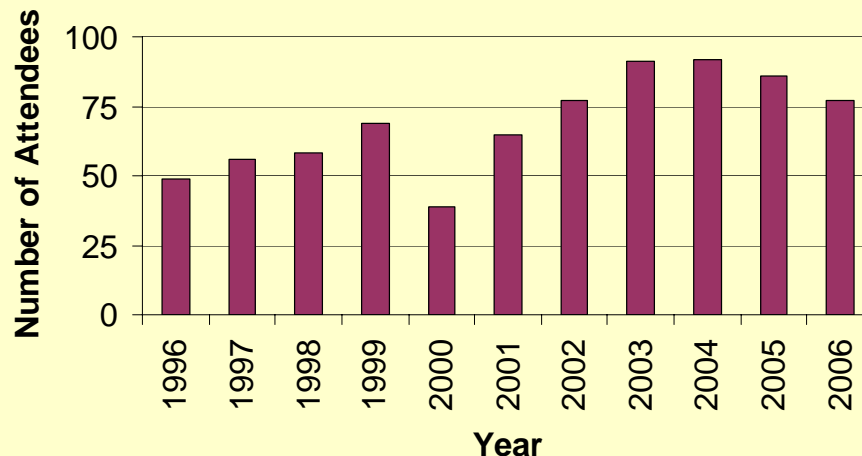
1. Reach a large fraction of new physics and astronomy faculty.
2. Help participants develop knowledge about recent developments in physics pedagogy.
3. Have participants integrate workshop ideas and materials into their classrooms.

## Activities:

- 4-day conference at American Center for Physics
- Presentations by prominent curriculum developers (e.g., Bob Beichner, Eric Mazur, Lillian McDermott, Evelyn Patterson, David Sokoloff, Ronald Thornton)
- Small group breakout/discussion sessions

# Attendees

Average of 69 attendees/year – 25% of all new physics and astronomy faculty



\*R. Ivie, S. Guo, and A. Carr, *2004 physics & astronomy academic workforce* (American Institute of Physics, College Park, MD, 2005).

## Attendees

Represent institutional types of the national population of faculty

Highest Phys. and/or Ast. Degree	Percentage of NFW Attendees	Percentage of Faculty at Degree Granting Institutions*
None	1.5%	N/A
Bachelor's	38.9	30%
Master's	5.5	10
PhD	54.0	60

\*R. Ivie, S. Guo, and A. Carr, *2004 physics & astronomy academic workforce* (American Institute of Physics, College Park, MD, 2005).

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## The NFW Should Not Work

- 1. It is a short (4-day), one-time intervention**
- 2. It is transmission-oriented**

“Faculty development benefits from making use of extended interventions, over a full semester, a year, or more.” (Emerson, 2000, p. 29).

Workshops and seminars “are unlikely to produce lasting changes in teacher behavior or lasting impact on students unless participants continue skill practice and receive critical feedback on their efforts.” (Levinson-Rose, 1981, p. 419).

J. Levinson-Rose and R. J. Menges, "Improving college teaching: A critical review of research," *Review of Educational Research* 51, 403-434 (1981).

J. D. Emerson and F. Mosteller, "Development programs for college faculty: Preparing for the twenty-first century," in *Educational media and technology yearbook 2000*, edited by R. M. Branch and M. A. Fitzgerald, 2000, Vol. 25, p. 26-42.

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## The NFW Does Work

Data from a web-based survey of all 690 NFW participants who were still in academia and could be located. Response rate of 76%.

### The NFW:

1. Increases knowledge about and attitudes towards PER-based instructional strategies
2. Results in changes in teaching behavior

Examples of supporting data will be presented here. More complete support can be found on my web site.

## Knowledge/Use of PER Strategies

	I currently use	I have used in the past	I am familiar, but have never used	Little or no Knowledge
Astronomy Tutorials	8.7%	5.0%	30.2%	<b>56.1%</b>
Collaborative Learning	<b>39.2</b>	17.2	23.0	20.6
Cooperative Group Problem Solving	<b>47.2</b>	21.9	22.9	8.0
Interactive Lecture Demonstrations	<b>46.1</b>	24.2	23.4	6.3
Just-In-Time Teaching	22.9	18.0	<b>50.9</b>	8.2
Peer Instruction	<b>54.1</b>	21.4	22.4	2.1
Realtime Physics	5.2	7.5	<b>46.6</b>	40.7
Personal Response Systems	32.6	15.0	<b>43.7</b>	8.7
Physlets	19.7	21.4	<b>41.3</b>	17.5
Tutorials in Introductory Physics	13.1	20.9	<b>45.8</b>	20.3

## Reinvention of Instructional Strategies is Common

### Self-reported instructional practices of self-reported users of Peer Instruction (N=192)

22. During the most recent time you taught the course, over the semester or quarter, how frequently did/do you use the following teaching strategies during the lecture portion of your course?

	Never	Once or twice per term	Several times per term	Every Week	Nearly every class	Multiple times every class
1. Students solve/discuss qualitative problem	3%	1%	12%	25%	<b>33%</b>	27%
2. Pair or small group discussion	4	2	15	24	25	<b>30</b>
3. Instructor questions answered simultaneously by entire class	8	2	8	15	26	<b>40</b>

**All three 'multiple times every class' = 19%**  
**All three at least 'nearly every class' = 38%**

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## Positive Attitudes

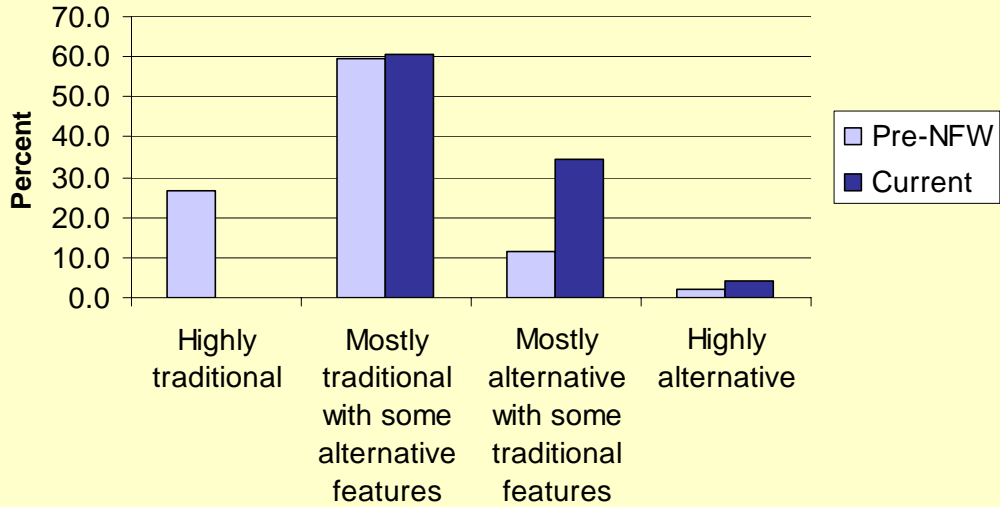
11. Right after the New Faculty Workshop weekend were you interested in incorporating some of the workshop ideas into your teaching?

Yes	<b>93.7%</b>
No	2.1
I don't recall	4.2

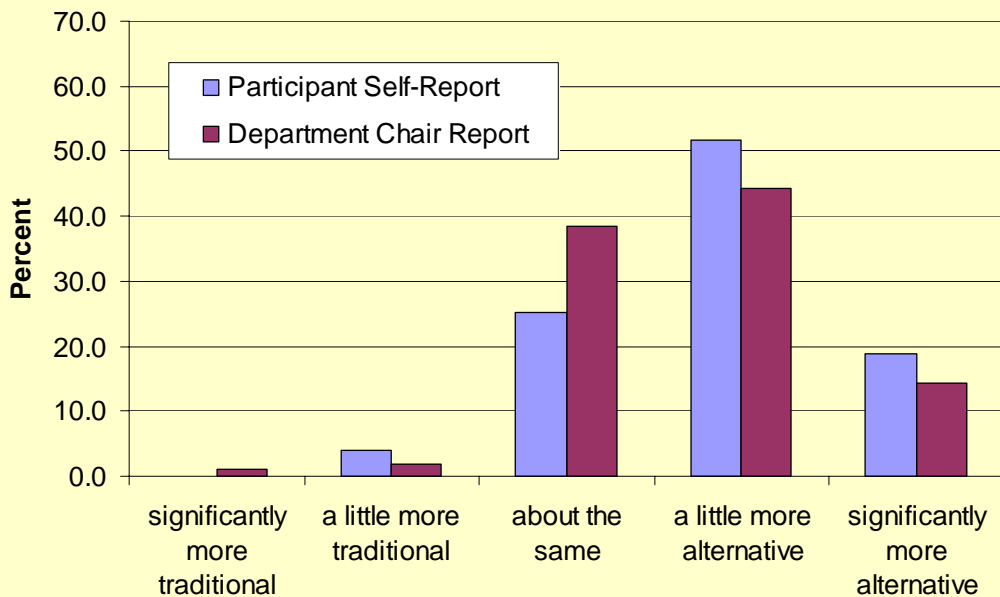
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# Changes in Instructional Practices

Self-Assessment of Overall Teaching Style



# Current Instructional Practices Compared to Other Faculty in Their Department

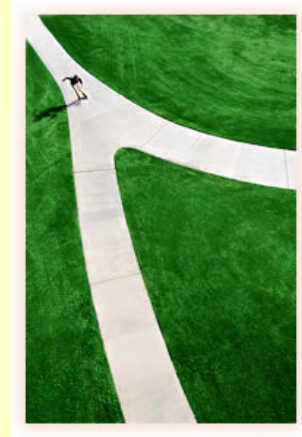


## Why is the NFW Effective?

**Hypothesis: It is a gateway experience that introduces faculty to PER-based instruction and motivates them to work on instructional improvement after the NFW.**

All new faculty struggle with teaching. Most faculty respond by focusing on better preparation of facts and principles lecturing and lowering standards.\*

The NFW appears to help faculty find a different, more productive path.



\*R. Boice, "New faculty as teachers," Journal of Higher Education 62, 150-173 (1991).

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## Evidence for Gateway Theory

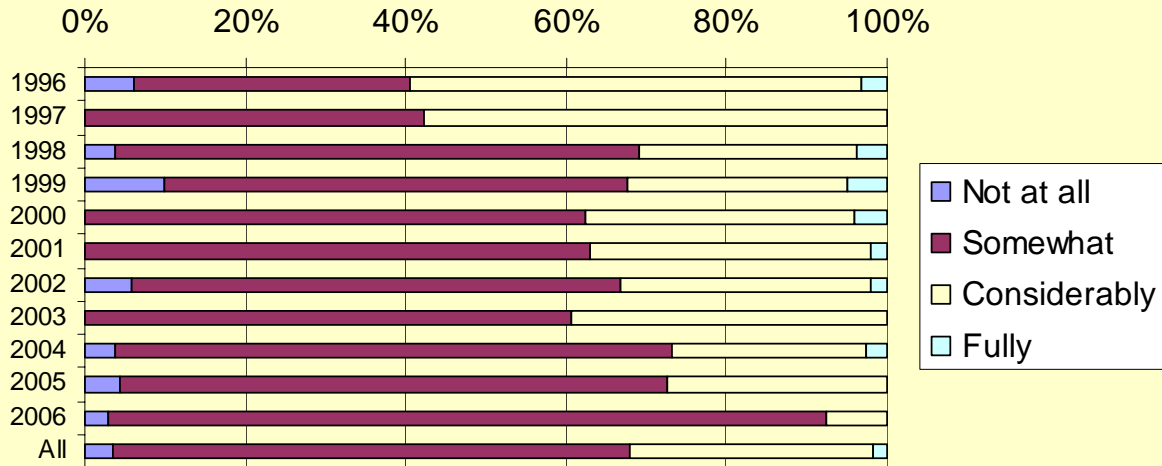
### Participant self-report

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- It [the NFW] provided an important seed, and in that sense has influenced much of what I've done.
  - It's [the NFW] biggest impact was to make me aware of teaching issues. It led me to later participate in many other teaching workshops.
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## Evidence for the Gateway Theory: More Changes Made As Time Passes

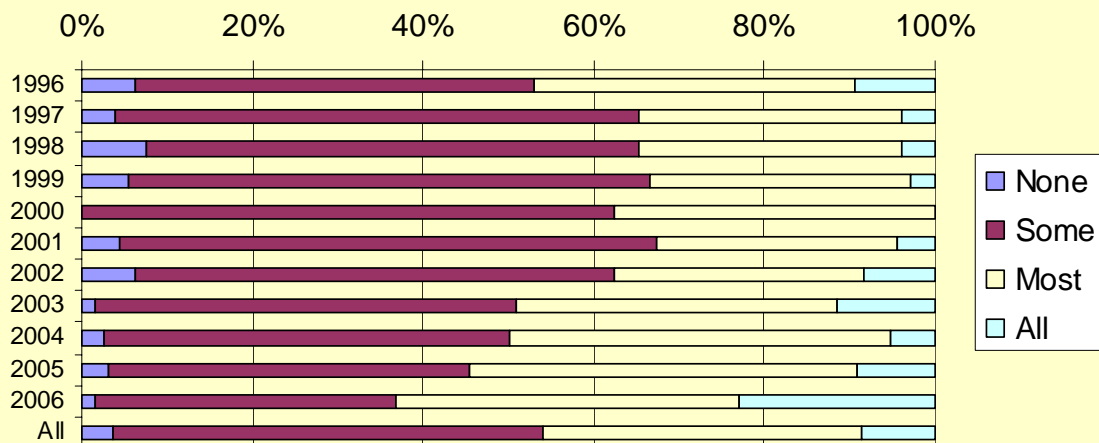
How much has your teaching changed since your participation in the NFW?



## Evidence for the Gateway Theory: Changes Less Attributable to NFW As Time Passes

(participants have sought out other information or experiences for instructional improvement)

How much of this change in teaching do you attribute to the NFW?



## Why is the NFW an Effective Gateway Experience (when many other programs are not)?

Keys to the success of the NFW may be that:

- 1) It is sponsored and run by three major disciplinary organizations.
- 2) It introduces participants to a wide variety of PER-based instructional strategies and materials.
- 3) Presentations are made by the leading curriculum developers in PER.

Disciplinary cultures can have a significant impact on faculty behavior.<sup>1</sup>

Faculty may be skeptical of workshops that “sell” one particular strategy.<sup>2</sup>

Reputation of the reformer and/or their institution impact how a reform message is received.<sup>3</sup>

1. J. S. Fairweather, *Faculty work and public trust: Restoring the value of teaching and public service in American academic life* (Allyn and Bacon., Boston, 1996).
2. C. Henderson and M. Dancy, "Physics faculty and educational researchers: Divergent expectations as barriers to the diffusion of innovations," (submitted).
3. J. Foertsch, S. B. Millar, L. Squire, and R. Gunter, *Persuading professors: A study of the dissemination of educational reform in research institutions* (University of Wisconsin-Madison, LEAD Center, Madison, 1997).

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## Summary

The NFW has been effective in meeting its goals of introducing new faculty to PER-based ideas and materials and motivating faculty to try these ideas and materials.

The NFW appears to be contributing significantly to the spread of PER ideas.



# The End

**More information at:**

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