How to Succeed in Physics Outreach

Without Really Trying

(lessons learned from the Wonders of Physics Traveling Show)

THE UNIVERSITY of WISCONSIN MADISON

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Special Seminar

UW Physics Department

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Statements relevant to UW Physics labs in red.

Experience from the Wonders of Physics Traveling Show

- 350 performances to grades K-12
- Hour-long “engage and excite” program
- ~20 demonstrations presented at each show
- Diverse audiences
- http://uw.physics.wisc.edu/~wonders

Plenty of Room for Everyone!

- The American public has an apparently inexhaustible demand for science outreach.
- No single style of outreach can satisfy this demand!
- Comments herein are intended to be descriptive, not prescriptive.

Exhibit Natural Phenomena

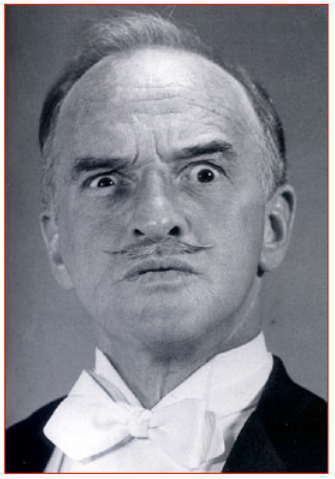
- Fight the “black box”!
- Defend the law of cause and effect!
- If not you, who?
- Either the phenomena or the apparatus had better be familiar to the observer

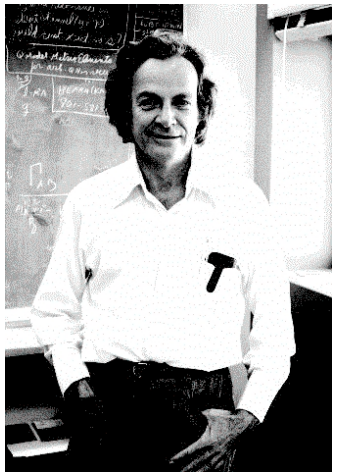
Encourage the Study of Math

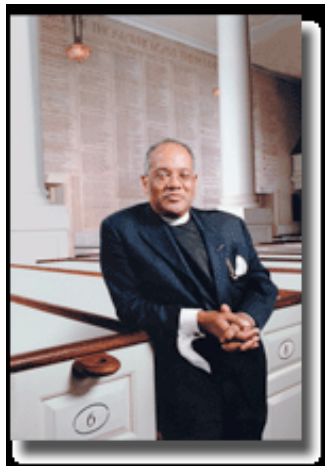
- The language of science
- #1 impediment to undergraduate physics teaching in the service courses
- Integration Bee coming up 4/06: http://uw.physics.wisc.edu/~reardon/IntegrationBee.html

Seek Models for Your Presentation Style

Reardon: Buckley, Feynman, Gomes







UW Physics Labs: Michigan, Minnesota, Iowa…

You, the incoming teaching assistant…?

Present an Outline

- “Physics is the Study of Motion”
- Aka “Differential Equations is the language of the Universe”
- Motion, Heat, Sound, Light, Electricity, Magnetism exhausts the service course curriculum

Leave Excitement in Your Wake

- A teacher can teach far more in a semester than you can in a hour
- A student can learn far more in a lifetime than a teacher can teach in a semester
- State your outline, depart from your outline, never return to your outline

Treat People as Distinguishable Particles

- The frontier between outreach and Physics Education Research
- Avoid thinking in terms of norms and standard deviations
- Giving personal attention to TA's will be the largest part of the lab director's job

Allay Fear

- Students already know much of the physics we are trying to teach them in the service courses (cf Plato's *Meno)*
- Teachers abhor a vacuum
- Leave "gatekeeping" to the students themselves

Knowledge is Safety

- Most people like things that go “bang”
- This can be used to facilitate the teaching process…
- …and also safety training

Use words to impedance-match your demonstrations to your audience

- The same set of demonstrations can be used for a wide variety of audiences
- There is no one perfect set of demonstrations for a given audience
- Good demonstrations rarely need to be changed

Target Middle School and Below

- Eg. Faraday's Christmas Lectures, est. 1825
- Larger and more inquisitive audience
- Other than energy, inertia, atom, electron, all service course physics can be explained using only elementary school words

Create Expansion Slots

- Aka “Engineering”
- Contrast the simplicity of physics with the multiplicity of applications, many as yet undiscovered

Remember the Wisconsin Idea

Make “…the beneficent influence of the University available to every home in the state…”

Introducing young people to the natural world is the right thing to do.

How to Succeed in Outreach Without Really Trying

A. Obtain a position at a major university with a large demonstration set, a pool of enthusiastic resident experts, and an unimpeachable reputation
B. Live in a country where the people have a genuine interest in science