

An Educational Summer

Playing With The Physics Teachers

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Humbly representing

American Association of Physics Teachers



SOCIETY OF PHYSICS STUDENTS
National Organization

Where I've been...

- .Green River Community College
- .The best little College in Washington State
- .AS-S Engineering Pre Chemical
- .AS-S Physics/Chemistry
- .Where I'm going...**
- .University of Washington
- .Majoring in Chemical Engineering and Physics
- .Where am I now?**

Working for AAPT on the future of Physics education

The Issues- Rising Above The Gathering Storm

A report from the National Academy of Sciences



- 'Having reviewed trends in the United States and abroad, the committee is deeply concerned that the **scientific and technological building blocks** critical to our economic leadership **are eroding at a time when many other nations are gathering strength.**'

- 'Although many people assume that the United States will always be a world leader in science and technology, this may not continue to be the case inasmuch as **great minds and ideas exist throughout the world. We fear the abruptness with which a lead in science and technology can be lost—** and the difficulty of recovering a lead once lost, if indeed it can be regained at all.'

The Committee' Recommendations

*Recommendation A: Increase America's talent pool by **vastly improving K-12 science and mathematics education.***

K-12 is the heart of education- It is where we draw on their natural curiosity to inspire, or through lack of inspiring, lose our children

Action A-3: Enlarge the pipeline of students who are prepared to enter college and graduate with a degree in science, engineering, or mathematics

*Recommendation C: **Develop, recruit, and retain** the best and brightest students, scientists, and engineers from within the United States and throughout the world.*

Action C-1: Increase the number and proportion of US citizens who earn bachelor's degrees in the physical sciences, the life sciences, engineering, and mathematics

The Goal-Strengthening Physics Education

- Find our next generation of K-12 Physics educators, and through AAPT, provide them the support needed throughout their education to teach and inspire our children
- Encourage high school students to pursue an education in physics

The Plan- Find Them Where They Start

■ The Community College connection

‘Recruiting and educating the next generation of diverse, highly qualified teachers is a serious challenge, and one that community colleges can meet. With their expertise in teaching, **their diverse student bodies, and their strategic location in rural communities and inner cities where new teachers will be needed most, community colleges are in a pivotal position to play a key role in encouraging the most capable students to pursue careers in teaching’**

(From *Teaching by Choice: Community College Science and Mathematics Preparation of K-12 Teachers*, AACC)

Diverse- by 2010, 43% of K-12 kids will be minorities (US Census Bureau). Teachers with more diverse backgrounds are needed as role models

‘The Science and Mathematics preparation of the next generation of secondary and elementary teachers is a critical national concern. **Every Community College in this country has a role, an opportunity, and responsibility to address this challenge.’**

(From *The Integral Role of the Two Year College in the Science and Math Preparation of Prospective Teachers*, A 1998 conference sponsored by NSF)

The Pitch

My Role- Design material intended to encourage students of education and science to consider elementary and secondary teaching as a career

- **Students of Science know how important it is to the future**
- **Students of Education know how important it is to our children**
- **Recruit teachers of Science who know what science education means to the future of our world**

The idea is to get them to see each others viewpoint with the intended result of seeing that science education is the key to handing our children the future

From Science to Physics

Or, more appropriately, from Physics to Science-

What many students don't realize-

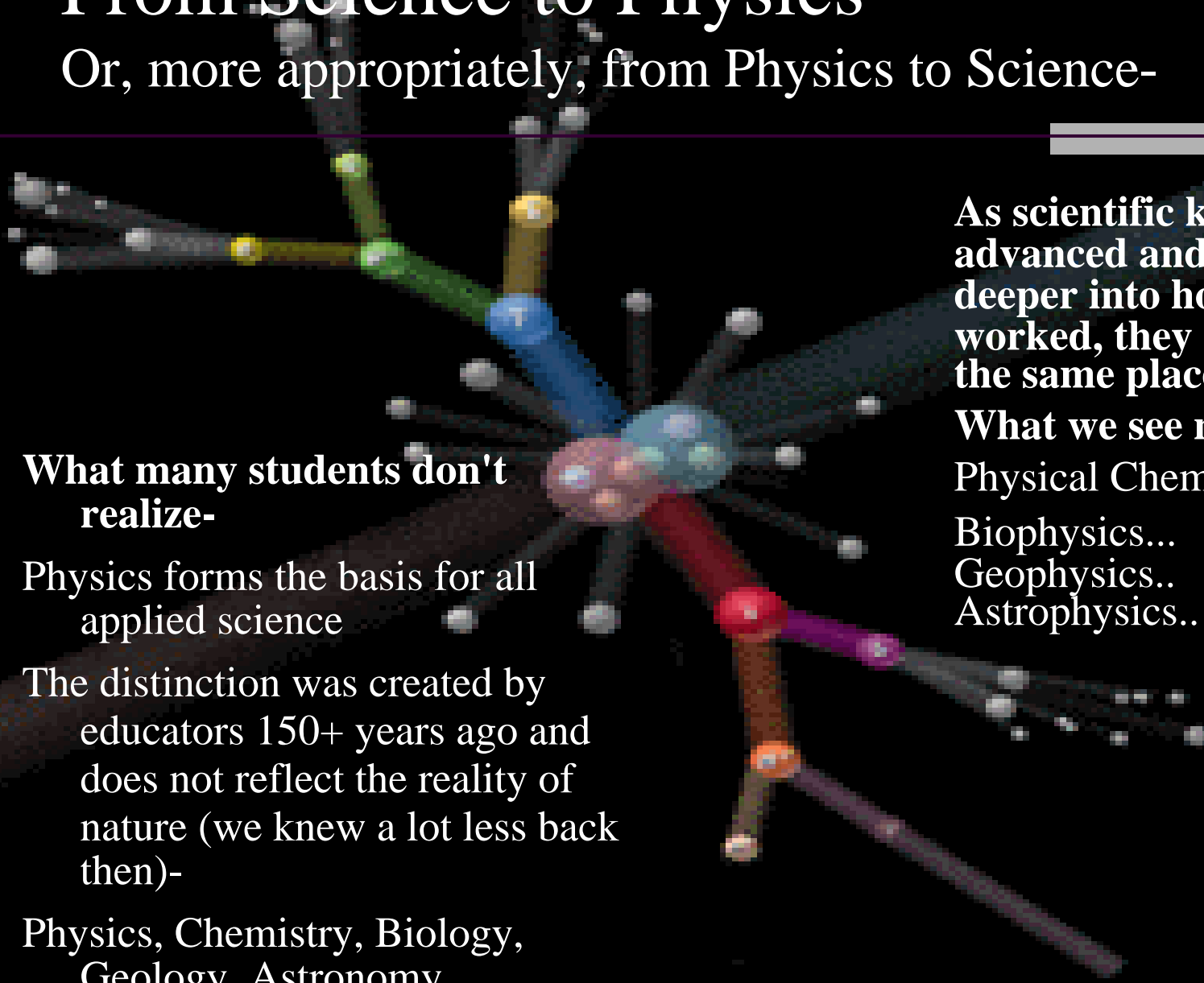
Physics forms the basis for all applied science

The distinction was created by educators 150+ years ago and does not reflect the reality of nature (we knew a lot less back then)-

Physics, Chemistry, Biology, Geology, Astronomy

As scientific knowledge advanced and we looked deeper into how the world worked, they all met at the same place.

What we see now-
Physical Chemistry...
Biophysics...
Geophysics..
Astrophysics..



The Need- Teach and Inspire

- You don't need a graduate degree in Physics to reach them...
 - You don't even need a BS in Physics
 - I've only got an associates so far, and I found them- They're right here
- ↓↓↓↓↓



- Predict..
- Play..
- Analyze...
- Conclude...
- It's the scientific process, 3rd grade style



Teach and inspire- cont...

Conceptual basics early in education-

Many students of education are scared away by the complexity of advanced physics

These third graders saw and understood the concepts of

- Gravitational potential energy
- Kinetic energy
- Applied force
- Transfer of momentum

And never saw a single equation

The ability of the teacher to guide children through recognizing and appreciating the basic interactions of nature does not depend on their understanding of the math involved, only on their inspiration by, and enthusiasm for the discovery process.

So You're Considering a Career in Physics Education

We need to offer student members educational support,
but how...?

A work in progress

Any important project starts with research

Design a survey that will generate useful answers about
what kinds of programs and services AAPT can offer
students to guide and support them in the educational
stages of their careers.

Get ideas by sitting in on and asking questions at the
committee meetings at the Summer meeting in
Greensboro

The Next Challenge...Finding Our Future Physics Majors

Reaching high school students before they are scared (or 'guided') away

See Physics in real life- It's not just equations... (to steal shamelessly from SPS)

A little story about a survey-

In a recent survey by AAPT asking High Schools who did not participate in the tryouts for the Physics Olympiad, an international physics competition, one of the top reasons given was-

We did not feel we had any students who would be competitive...

(The US team had 2 gold and 3 silver this year- our kids are able, they just need to want to learn)

This is for High School Students...

Unlock Your Future with an Education in Physics!!

One Key, Many doors...

Some you may know are Physics-

Education-

Children are curious about how the world works- Physics Teachers build our future by keeping that curiosity alive

Research Scientist-

Physics researchers make the discoveries that dictate the future of technology and change the course of history

Astronomy-

Astrophysicists study the interactions of bodies in space, and use radiology to determine their features and composition

Engineering-

Every discipline of Engineering depends on the laws of Physics- Understanding them makes better Engineers

Others you may not...

Environmentalist-

Physicists use thermodynamics and new materials to increase the efficiency of solar and wind energy, and improve recycling methods

Aeronautics-

Huge strides have been made since the days of the Wright Brothers, and Physicists have been involved in every step

Medicine-

Medical Physicists use x-rays, gamma rays, and particle beams to diagnose and treat. Biophysicists help Pharmaceutical researchers

Law-

People experienced in Physics are needed to identify and defend patents and intellectual properties

Chemistry-

Physical Chemists are involved in nanotechnology research with applications that will change the scale of all areas of technology

Computer Science-

Physics research will bring better semiconductors and quantum technology will be the basis for the computers of the future

Music Industry-

Laser technology brought CD's and DVD's. Acoustics, the physics of sound, is used in recording and concert halls

Geology-

Geophysicists study interactions of the Earth's geological formations and its electromagnetic properties

The list goes on- Fiber Optics, National Defense, Oceanography, Meteorology, Materials Science, Telecommunications, Journalism, Management, GPS Technology...

Seeing
Physics in
things they
care about

Making them
want to learn

Physics Is Your Key To Endless Possibilities

www.aapt.org



What is AAPT Spelled Backwards??

If you think it's TPAA, lets look at it another way-

AAPT's Goal- Strengthening Physics Education

Now let's read that backwards \longleftrightarrow

Strengthening Your Education in Physics

What AIP member society does this represent?

SPS, of course

Studying the interaction between physics educators
and their students-

Same dynamic, two frames of reference

A key element needs to be a partnership between SPS
and AAPT in supporting students and their teachers

So What Did I Learn From My Educational Summer?

- Didn't I just cover that....?
 - Getting our kids to be inspired to love the process of scientific discovery only requires tapping into their natural curiosity
 - Finding and properly preparing our future STEM (science, technology, engineering, math) teachers is essential to our place in the world
-
- But in addition-
 - A tribute to the administrative staff at AAPT - A small group of knowledgeable and skilled people can do amazing things-

Backing up a little

My unofficial thank you's-

- Keith Clay, for being everything we are looking for in our next generation of physics teachers
- Brett Carrol for letting me in the physics lab that day back in September, and never kicking me out
- Dmitriy Mironyuk, my partner in many crimes perpetrated through SPS Green River..
- Most of all, Ajay Naraynan, for getting me involved in SPS, and encouraging me to try

I am a product of Green River Community College- we have what every other CC needs- a teacher training program that inspires you to teach, and a physics program that teaches you to be inspired

Without this, I would never be in a position to thank....

And who were my Teachers?

Thank you very much to-

- Warren Hein and Rob Merz, and the rest of AAPT, who gave me a chance to be helpful in thier long term goals
- SPS, particularly Gary White and Liz Caron, for bringing me out here (they really took a chance)
- AIP and Jack Hehn for sponsoring the internship program
- My fellow interns (including Katie) for showing me how to have fun without my family