

PTRA Board Update

Atlanta, Feb. 2017

Presentation by Pat Callahan, PTRA Oversight Chair
Tommi Holsenbeck, incoming committee member

Goal update

- ▶ Partner with TYC and 4Yr. Univ. to provide sustainable content focused institutes based on fee-for-service arrangements
 - ▶ Lee College, UWG, UWRf, UTA, BYU, Moravian College, Wesleyan University, Penn State, Cornell, University of Scranton, Austin Community College, Bergen Community College....
- ▶ Edit, revise, and market current resources to comply with NGSS, STEM, and Common Core.
 - ▶ Currently in conversations with publication committee chair
 - ▶ Developed a model for revisions aligning to 5E and NGSS, John Roeder is working on revising his manual to see how it adapts
- ▶ Fulfill the AAPT Vision by providing activities to address the critical issues.
 - ▶ Diversity has been identified as a concern of the board. PTRA workshops target women, minorities, and nonSTEM majors. See PTRA director report for Oversight Committee
- ▶ Provide PD implementing NGSS Evidence Statements and alignment with district and state assessments.
 - ▶ Multiple sites in the past and working on new partnerships.
 - ▶ PTRA leadership workshop updates and addresses NGSS Evidence Statements
- ▶ Provide PD in underserved content areas (i.e. quantum) or groups (i.e. elementary, composite science)
 - ▶ UWG, Meggers, state conferences (TX, AL), ISU
- ▶ Expand services to educators via online resources, blended PD opportunities, etc.
 - ▶ Currently in conversations with publication committee chair

Grade Levels from surveys

Partial data (229 participants)

PTRA Workshop Attendance 2016

Which category below indicates the age of students you teach?

Answer Options	Response Percent	Response Count
K-2	11.4%	25
Elem 3-5	31.4%	69
Middle School 6-8	18.2%	40
High School 9-12	38.2%	84
Two Year College	0.5%	1
4 Year University	0.5%	1
Other (please specify)		16
	<i>answered question</i>	220
	<i>skipped question</i>	9

Grade Levels (broken down)

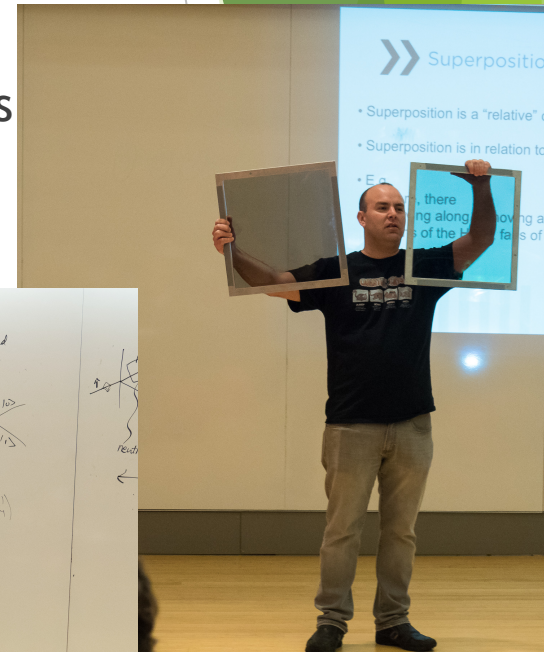
Answer Options	Core content teacher
Kindergarten	16
First Grade	3
Second Grade	7
Third Grade	11
Fourth Grade	29
Fifth Grade	22
Sixth Grade	15
Seventh Grade	11
Eighth Grade	33
High School Science	133
Secondary Math	9
Elementary Math	15
Computer Science	1
Two-Year College	1
4-Year University	3
Other	3

Alignment to AAPT Vision and ID of Critical Issues

- ▶ AAPT Vision: To be the leader in physics education. We are committed to providing the most current resources and up-to-date research needed to enhance a physics educator's professional development.
 - ▶ Using feedback from surveys to modify and adapt
 - ▶ Workshop leaders model research based pedagogy
- ▶ AAPT Critical Issues To Guide Activities: “Improve pedagogical skills and physics knowledge of teachers at all levels. Increase our understanding of physics learning and ways to improve teaching effectiveness.

Quantum: The new frontier

- ▶ Meggers funded beta sites in 2016 for a new PD model
- ▶ Set up 3 sites this summer in TX and charge fee
- ▶ Popular topic for section meetings
- ▶ Expanding to include basis of computers using materials from the Institute for Quantum Computing (IQC)
 - ▶ Security
 - ▶ Quantum computers



2017 Leadership Institute

- ▶ Modules that can be directly taken to section meetings or short workshops as way to become recognized as beneficial to educators
 - ▶ Perimeter Institute
 - ▶ Institute for Quantum Computing
 - ▶ Institute for Quantum Computing has agreed to come and share materials and explain content to the PTRAs. This is some pretty cool and thought provoking stuff. Excited about this additional partner in quantum (In addition to Perimeter)
 - ▶ Energy Resource Revisions
 - ▶ Technology updates
- ▶ Opened application process mid January via survey monkey
- ▶ Oversight committee will decide how to reimburse participants
- ▶ Wed-Saturday before AAPT meeting in Cincinnati Ohio
- ▶ Invite local teachers to attend

PTRA has been recognized for its excellence in providing effective and research based professional development in physics. Mini sessions (one day or less) have been shown to be ineffective in sustaining change in classroom practice. Therefore, PTRA continues to seek ways to provide “sustained” professional development as a service to both AAPT and non-AAPT members, at an affordable cost to individuals or districts.

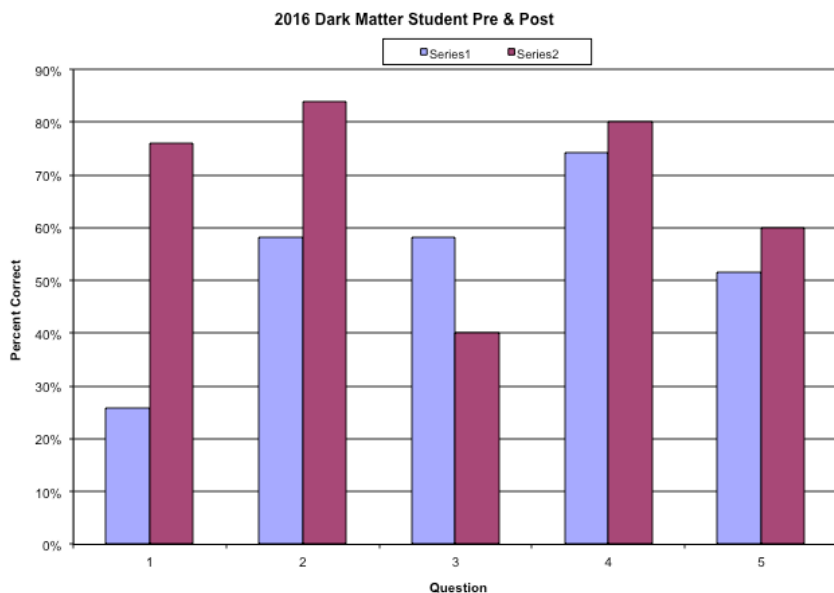
PTRA serves the AAPT community by providing workshops at AAPT conferences, section meetings, and NSTA conferences. All PD focuses on content and pedagogy with the integration of technology and modeling of best practices.

- ▶ Provided PD to estimated 1600 in 2015
 - ▶ +35 hours PD = 265 teachers
 - ▶ 2-6 hours PD = 1350 teachers
- ▶ Provided PD to over 1900 teachers in 2016
 - ▶ +80 hours (2 weeks) to 216 teachers
 - ▶ 1.5-6 hrs = 1560 teachers
 - ▶ 35-40 hrs PD = 200 teachers
- ▶ According to survey teachers average around 80 students. Estimated impact in 2016 = over **150,000 students**

Solving the Mysteries of Physics Technology (Meggers)—NEW PD model

- ▶ Report submitted September 2016
- ▶ The mean percent score on the pre assessment was 58.12 and the post was 72.83
- ▶ The maximum score on the post was 24 out of 25 as compared to the pre maximum score of 19.
- ▶ 90% of students responding to survey told us they went home and shared what they had done with their parents or peers

Sample data from Day 2



#1: correlation between velocity and radius for orbiting stars

#2: Why dark matter is “dark”

#3: Mass, radius, and period of orbits

#4: Vera Rubin experiment

#5: Methods used to study dark matter

QUANTUM PHYSICS PD FOR TEXAS HS TEACHERS (UNIQUE CONTENT & FORMAT)

Presented by Karen Jo Matsler, UT Arlington and Tom O’Kuma, Lee College



OVERVIEW

Professional development for HS teachers was conducted in June 2016 at Lee College (Baytown), Fort Worth Museum of Science and History, and Austin College (Sherman). The leaders were master physics teachers from the AAPT/PTRA program and all but one had previously attended the EPlus professional development at the Perimeter Institute in Waterloo, Ontario Canada. Leaders included Kenric Davies, Janie Head, Karen Matsler, Tom O’Kuma, Evelyn Restivo, and Michael Strange.

Attendees: 34 educators and 31 students from local middle and high schools

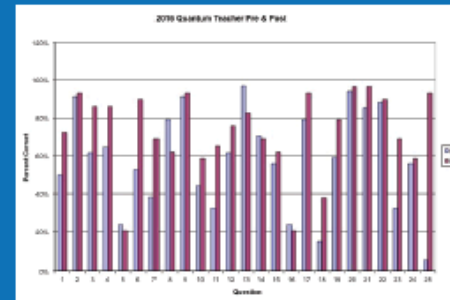
CONTENT

	Teacher	Student
Day 1	GPS, Dark Matter	
Day 2	Black Holes, Wave Duality	
Day 3	Particle Physics	GPS
Day 4	Particle Zoo	Black holes, Dark Matter
Day 5	Photoelectric, Planck’s	Particle Zoo, Wave Duality

The format of this PD was unique in that both teachers and students were involved. For the first few days, the focus was on teacher content and pedagogy in quantum physics. On the last 3 days, students were in attendance, and the student retention rate was 100%.

This unique format produced the following benefits:

- The incorporation of student participation allowed educators to practice what they learned before teaching the activities in their own classroom
- A new platform to introduce the students to quantum physics and how it relates to the technology they use everyday
- Opportunities for educators to work collaboratively and increase skill and confidence necessary for classroom implementation



RESULTS

Teachers took a pre and post-test focusing the content being addressed during the week. Students took short daily quizzes.

- Mean percent score on teacher pre-assessment was 58.12 and post was 72.83
- 12 of the 25 questions had Hake Gains over 0.40 and 6 had gains over 0.60

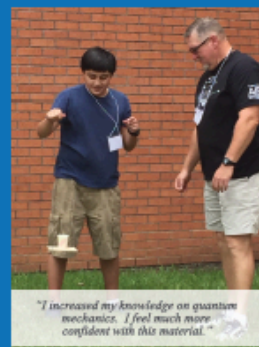
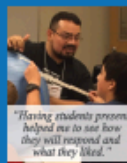
Over 90% of the students responding to the survey indicated they went home and shared what they learned with family or friends.

At first, the educators were nervous about the students coming, but they quickly appreciated the opportunity to practice what they had learned. Many were surprised by how the activities were received by the students. In fact, a few who were not initially impressed by the activities themselves, changed their mind after seeing the reactions of the students.



SUGGESTIONS FOR IMPROVEMENT

- Due to the newness of the topic, reduce the amount of content learned in one week or extend the length of the workshop.
- Having the students there to teach it to helped, but needed more time with students. One full day would be better. This would also facilitate car-pooling and transportation.
- The title of the workshop was evidently intimidating



Some of the student responses as to what they learned included:

- You need at least 3 satellites to use GPS
- Supermassive stars collapse into black holes
- There is more than just protons, neutrons, and electrons
- Time in space is different
- We cannot observe dark matter
- Add one more here?

UWG Evaluation Highlights

- ▶ Most of the participants had less than 1 year of experience
- ▶ Of the 116 completed pre and post-tests, 86 (74.1%) had statistically significant gains
- ▶ Nine (of 28) questions had a Hake Gain over 0.40
- ▶ Math integration: Out of 46 matched elementary scores, 25 (52.17%) had statistically significant gains on a Numbers and Operations test (state administered)
- ▶ Classroom observations were done using OTOP. In *every* case, the means increased as rated in the spring and the following fall observations, presumably as a result of the summer intervention. Of the 10 items on the OTOP, 6 were determined to be statistically significant at a level of 0.001

Note: Math was over 2 year period so not all scores matched

Overall Survey trends indicate:

- ▶ About 30% are male participants
- ▶ 47% were from a high needs campus
- ▶ 46% had taught 5 years or less
- ▶ Around 10% are first year teachers
- ▶ Less than 10% majored in physics, physics education, or related physics field
- ▶ 96% were from public schools

Social Media Presence

- ▶ Facebook: posts and membership (160) has increased over the past year including participants in workshops. Generated discussions on teaching tips, misconceptions, and general concepts.
- ▶ Twitter: not where we want it yet, but getting better
- ▶ Instagram: added widget to automatically post instagram pics to website
- ▶ Website (<http://aaptpra.com/>) has information and pics of all the workshops, links for workshop leaders to collect participant information prior to and after workshop, and relevant information.

2016 Workshops

2016 WORKSHOPS


[Show picture list]



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Instagram



3 months ago
Force and Motion workshop by #TSAAPT

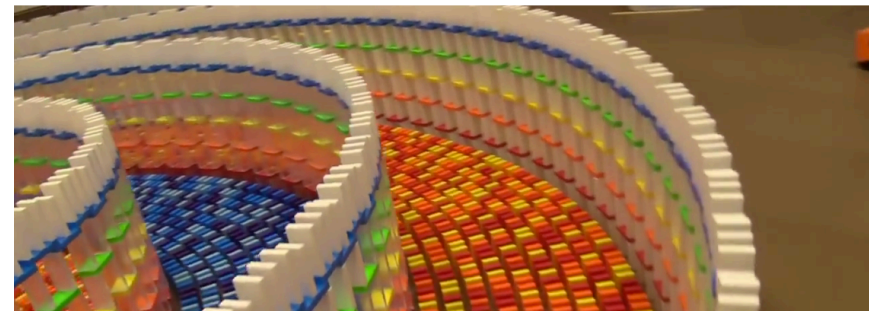
The image shows a social media widget for Instagram. It includes a 'Connect With Us!' section with icons for email, Facebook, Instagram, and Twitter. Below that is an Instagram post thumbnail showing a workshop activity with people sitting on the floor. The caption for the post reads '3 months ago Force and Motion workshop by #TSAAPT'.

Josh Underwood shared My Modern Met's video.

November 7, 2016 · Burtonville, KY

Think I'll include this when talking about angular vs linear speed. Is it possible to make all rows of the first spiral end together? I haven't played enough with dominoes to know off hand but could be a fun thing to try out.

<https://www.facebook.com/mymodernmet/videos/10154607133124299/>



Comments from participants

- ▶ “I really like how the content is connected to instructional practices that should be used in our classrooms.”
- ▶ “I didn't think I would grasp this, however the way the workshop was done it built on my prior knowledge which assisted in me learning the content.”
- ▶ “I learned how to integrate science and math together and how to implement labs.”
- ▶ “The connection of concepts between each subtopic was very beneficial.”
- ▶ “I now understand how to implement hands on lessons with our standards and have a deeper understanding of the content.”

Requests for the Board of Directors

- ▶ Recognize PTRA as the primary professional development provider for AAPT
- ▶ Make the AAPT/PTRA program a priority when identifying or applying for grants and funding.
- ▶ Provide financial support to maintain the cadre of experienced master teachers and trainers.