

# The AAPT/PTRA ToPPS Program at NWOSU



American Association of Physics Teachers  
Physics Teaching Resource Agents

IMPROVING TEACHER QUALITY  
THROUGH TRAINING OPPORTUNITIES

TEACHERS OF  
PHYSICS AND  
PHYSICAL SCIENCE

A graphic of the state of Oklahoma, filled with a vertical gradient from yellow at the top to red at the bottom. The text 'OKLAHOMA' and 'ITQ/TOPPS' is overlaid on the right side of the state outline.

OKLAHOMA  
ITQ/TOPPS

**Summer AAPT Meeting**  
Portland, OR  
July 17, 2013

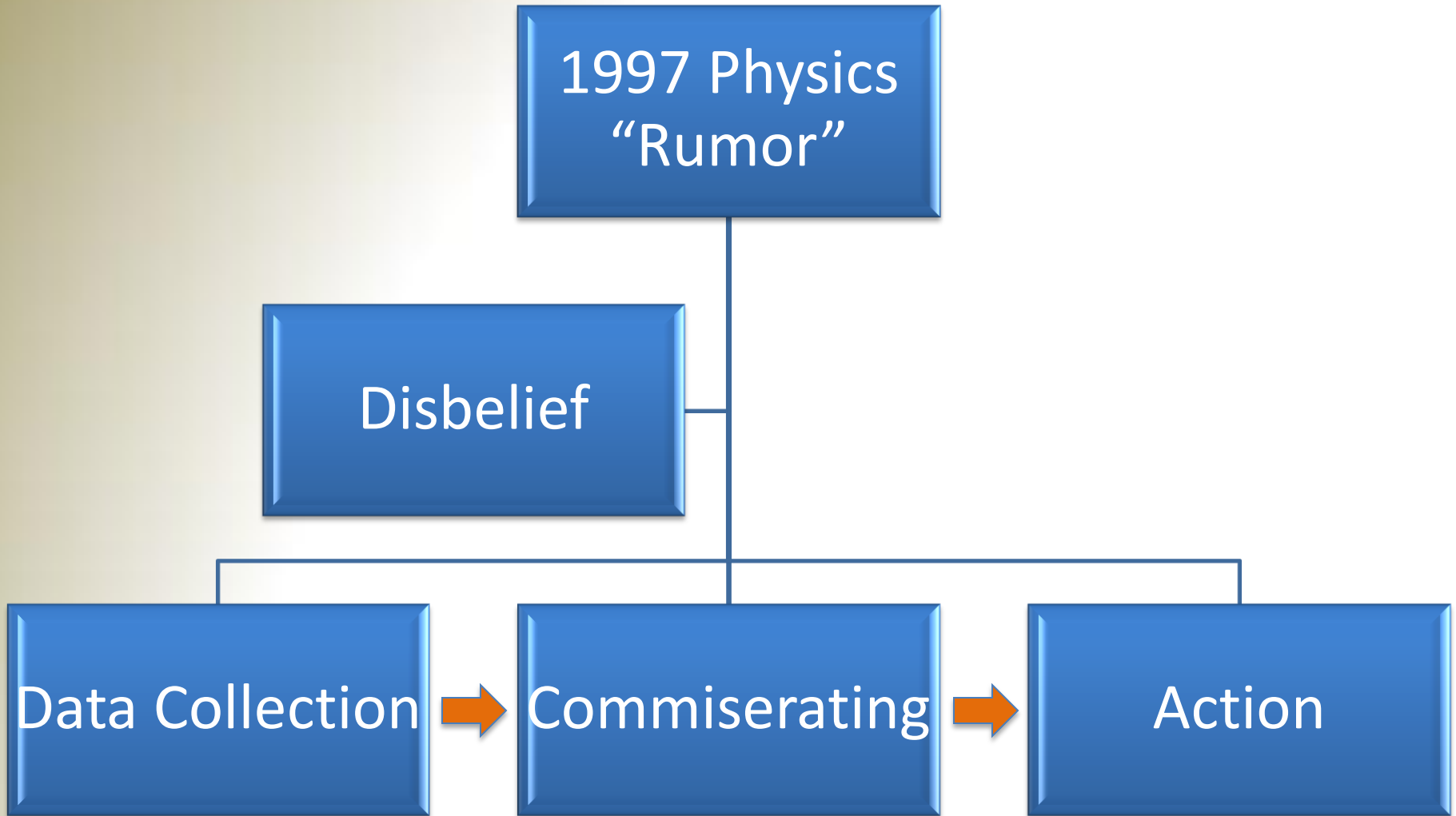
Steven J. Maier

Northwestern Oklahoma State University  
Associate Professor of Physics

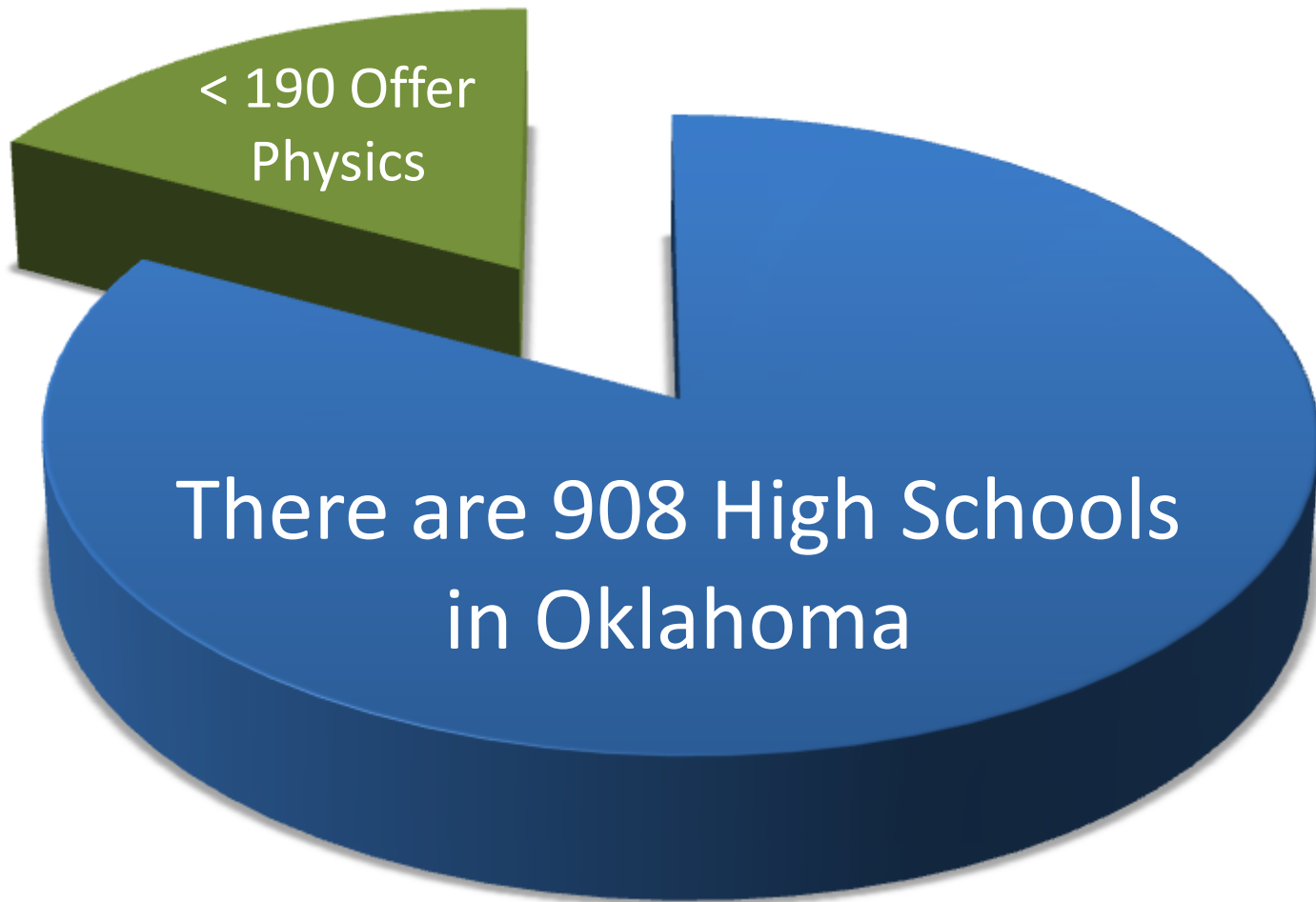
Saeed Sarani

Oklahoma State Regents for Higher Education  
STEM Coordinator

# Where The Story Began . . .



# Oklahoma SDE Self-Reported Data



# Locations of High Schools Offering Physics

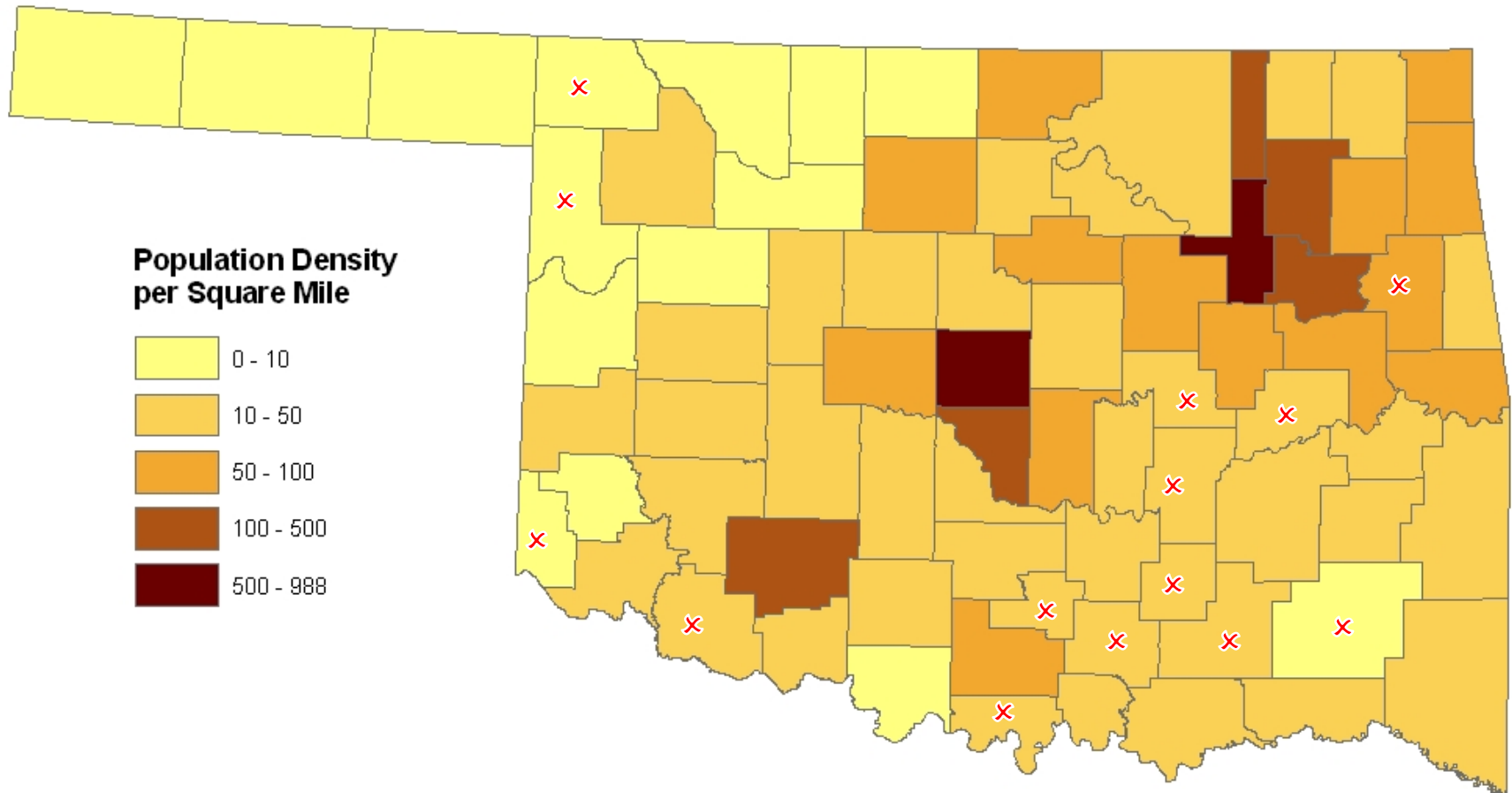
Google maps

oklahoma physics teachers

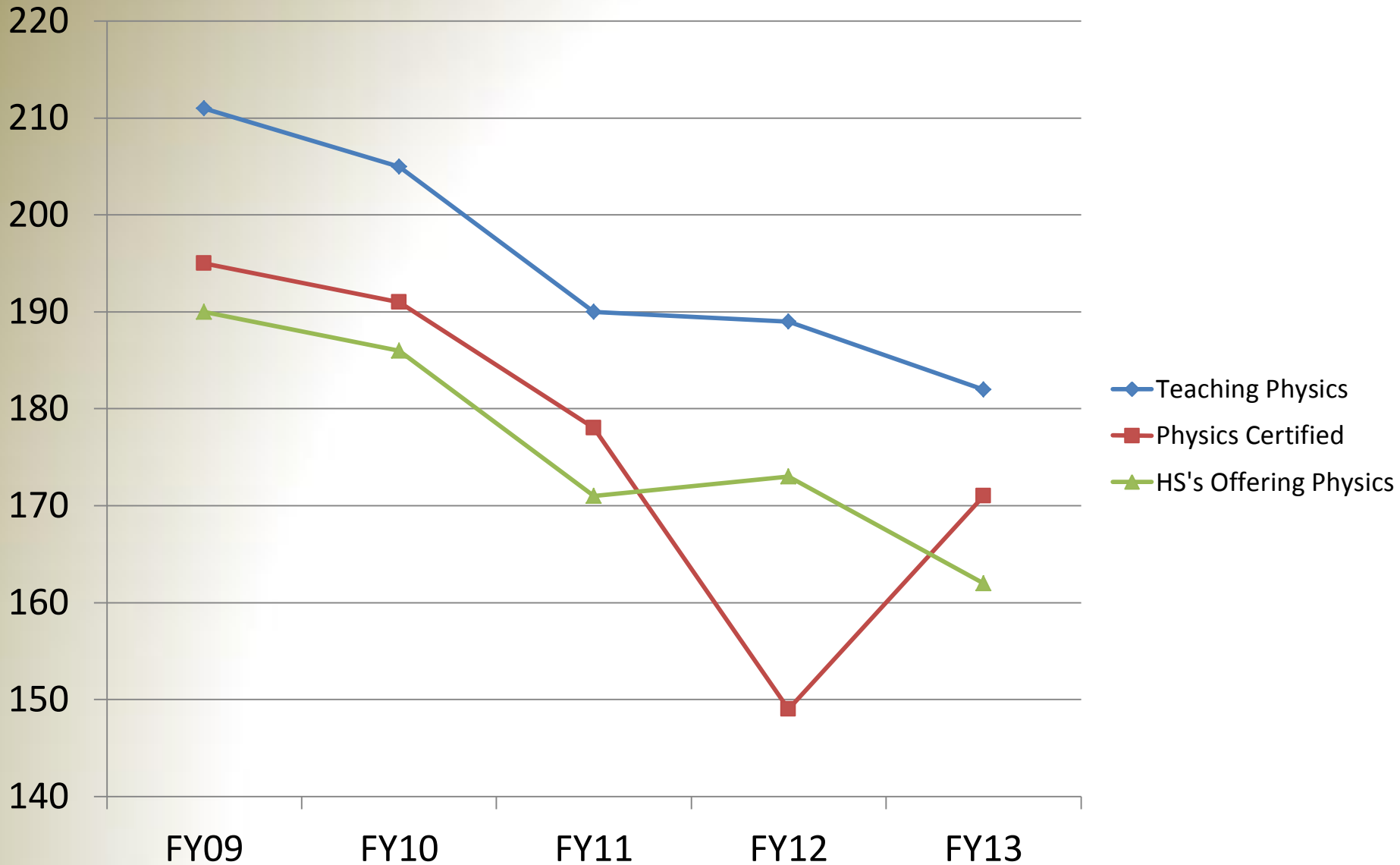
Search Maps



# Counties Not Offering High School Physics in 2008 – 09



# Decreasing HS Physics Accessibility





# Teachers of Physics and Physical Science



Force & Motion



Energy & Momentum



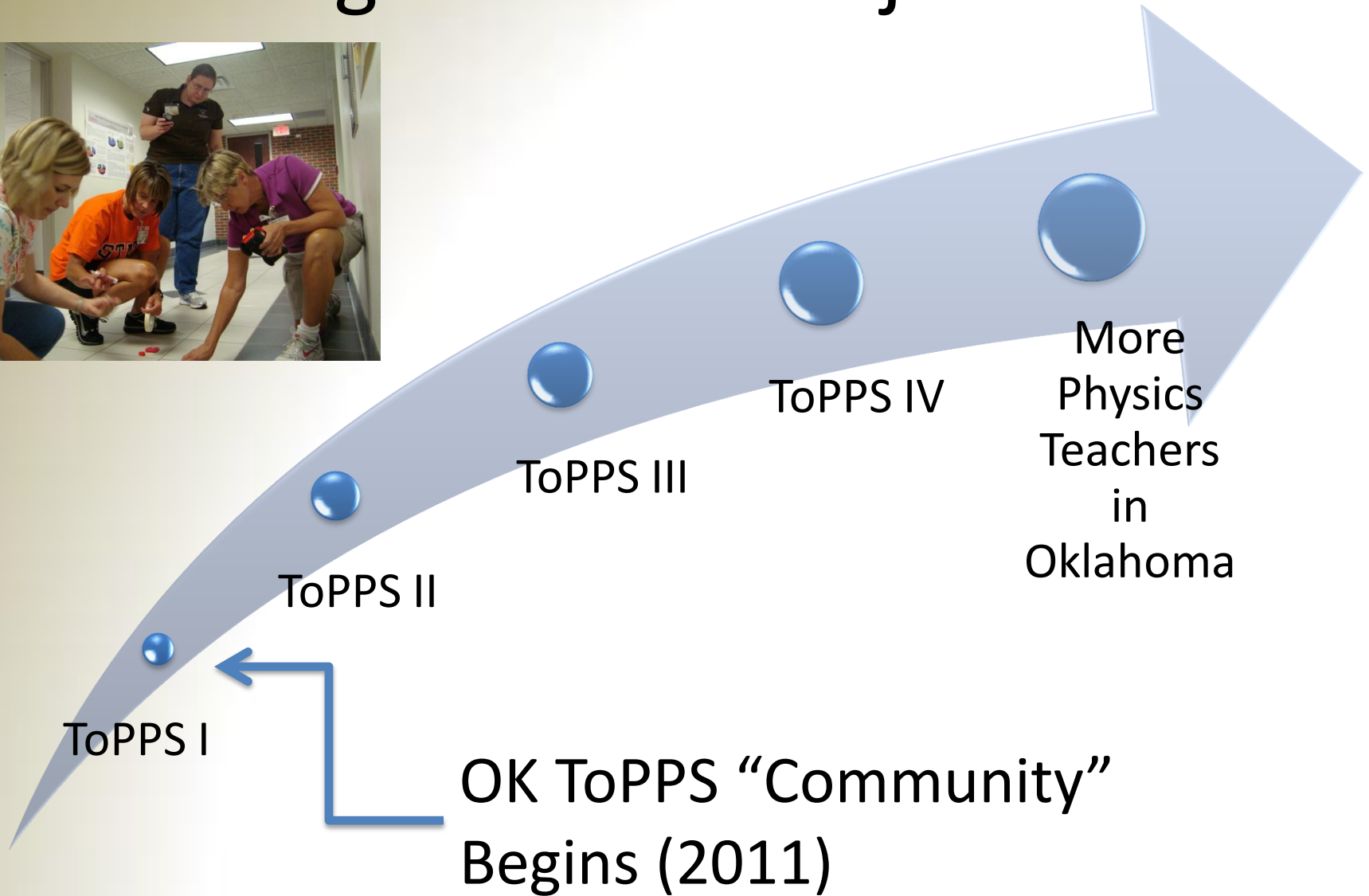
Electricity & Magnetism

# Initial Objectives of NWOSU ToPPS

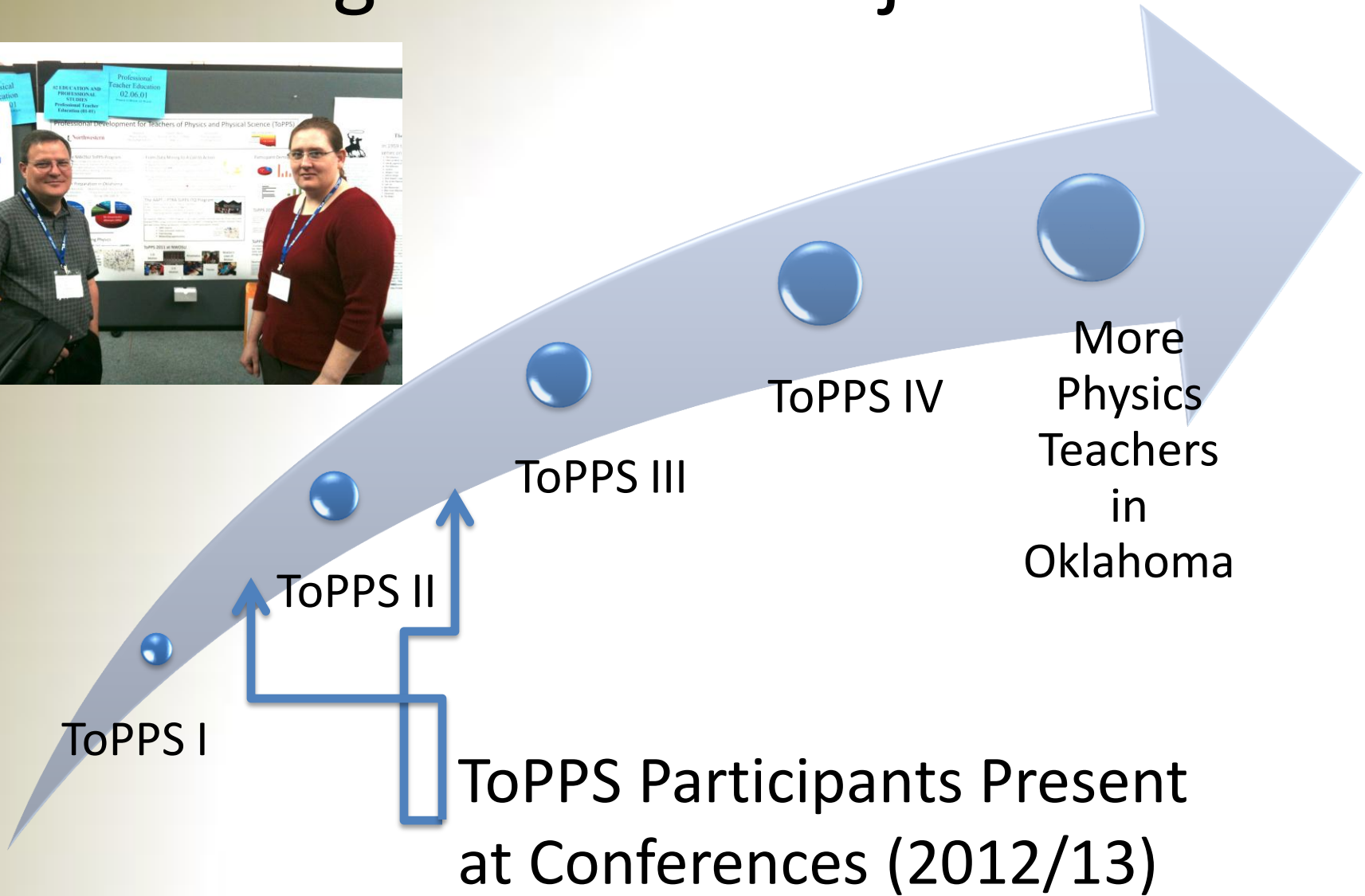
- PD in physics/physical science
  - Appropriate for demographics
  - Resources for rural science educators
- Networking
- Physics education awareness
  - AAPT, PER, PTEC . . . “What are those?”
  - Higher Ed and research communities are aware of *you*



# Progression of Objectives



# Progression of Objectives



ToPPS I

ToPPS II

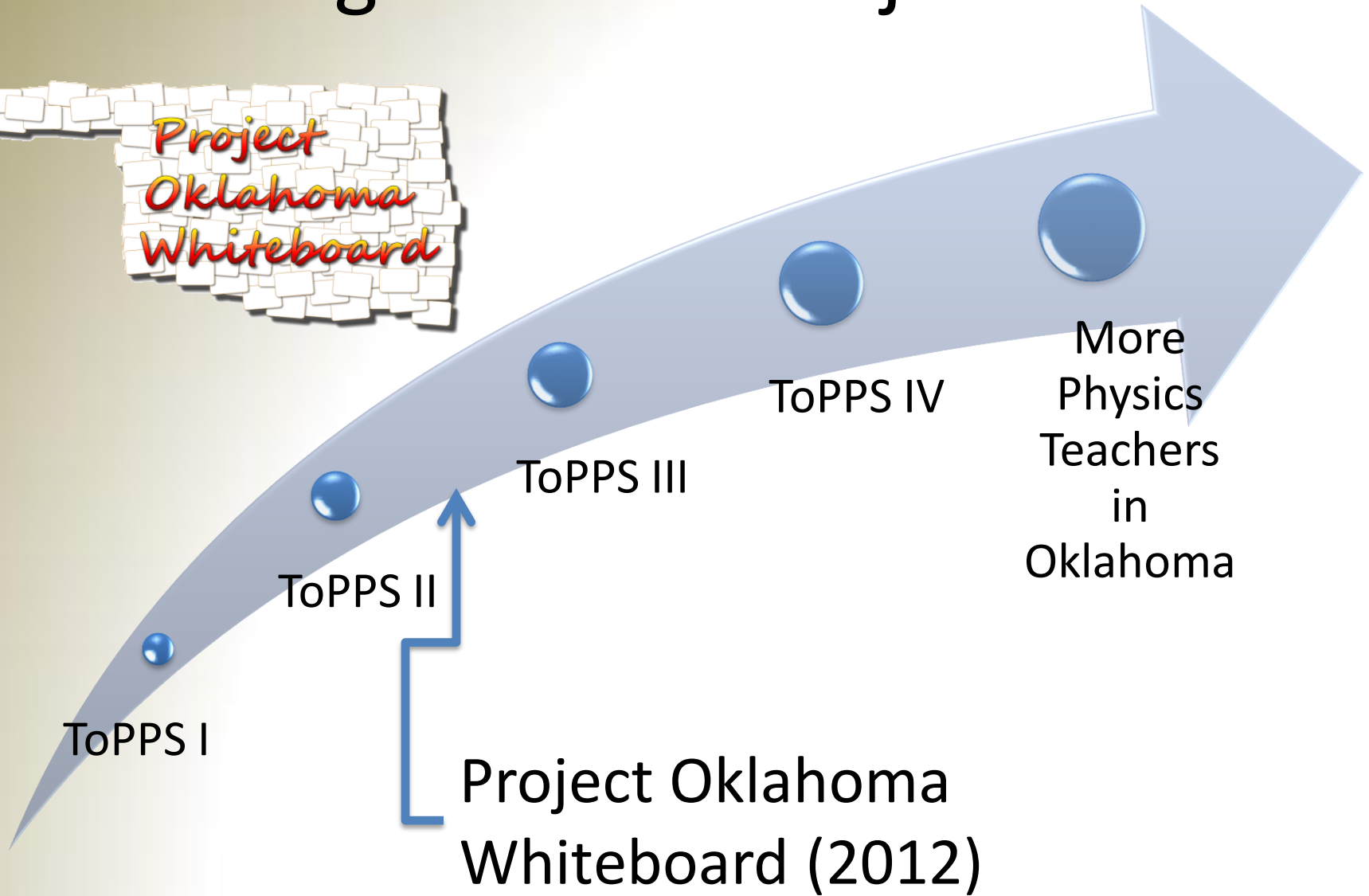
ToPPS III

ToPPS IV

More  
Physics  
Teachers  
in  
Oklahoma

ToPPS Participants Present  
at Conferences (2012/13)

# Progression of Objectives



ToPPS I

ToPPS II

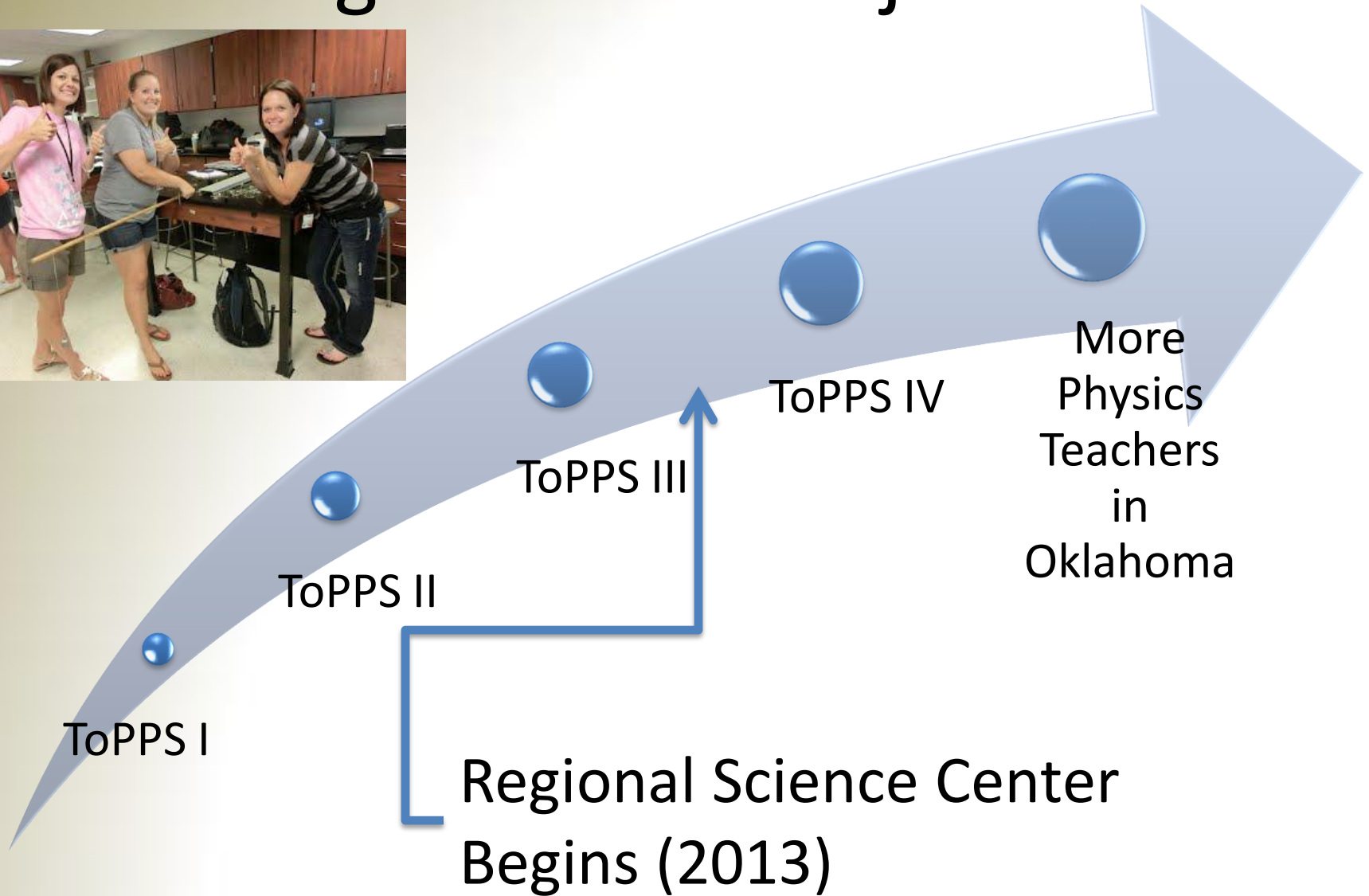
ToPPS III

ToPPS IV

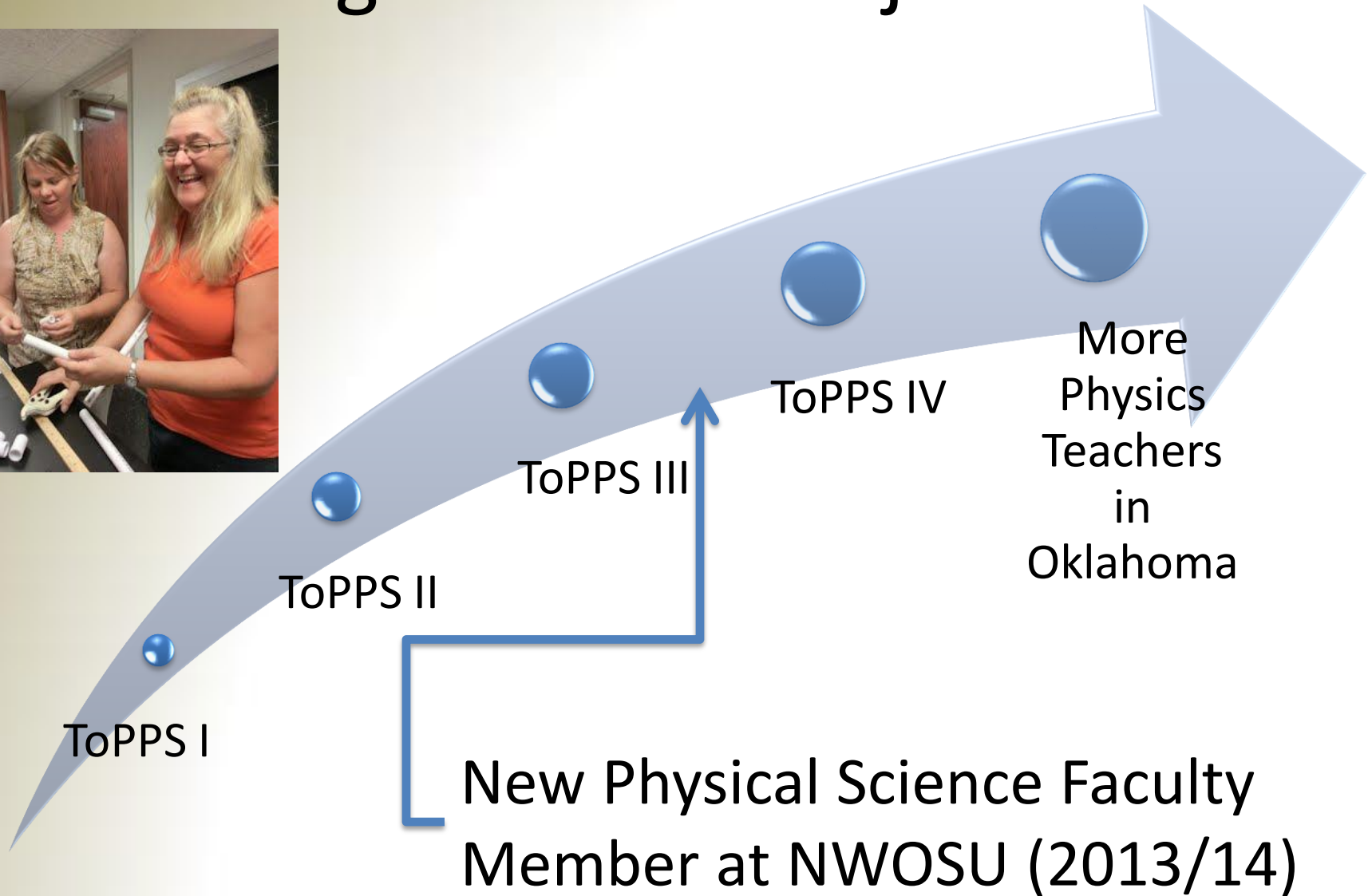
More  
Physics  
Teachers  
in  
Oklahoma

Project Oklahoma  
Whiteboard (2012)

# Progression of Objectives



# Progression of Objectives



ToPPS I

ToPPS II

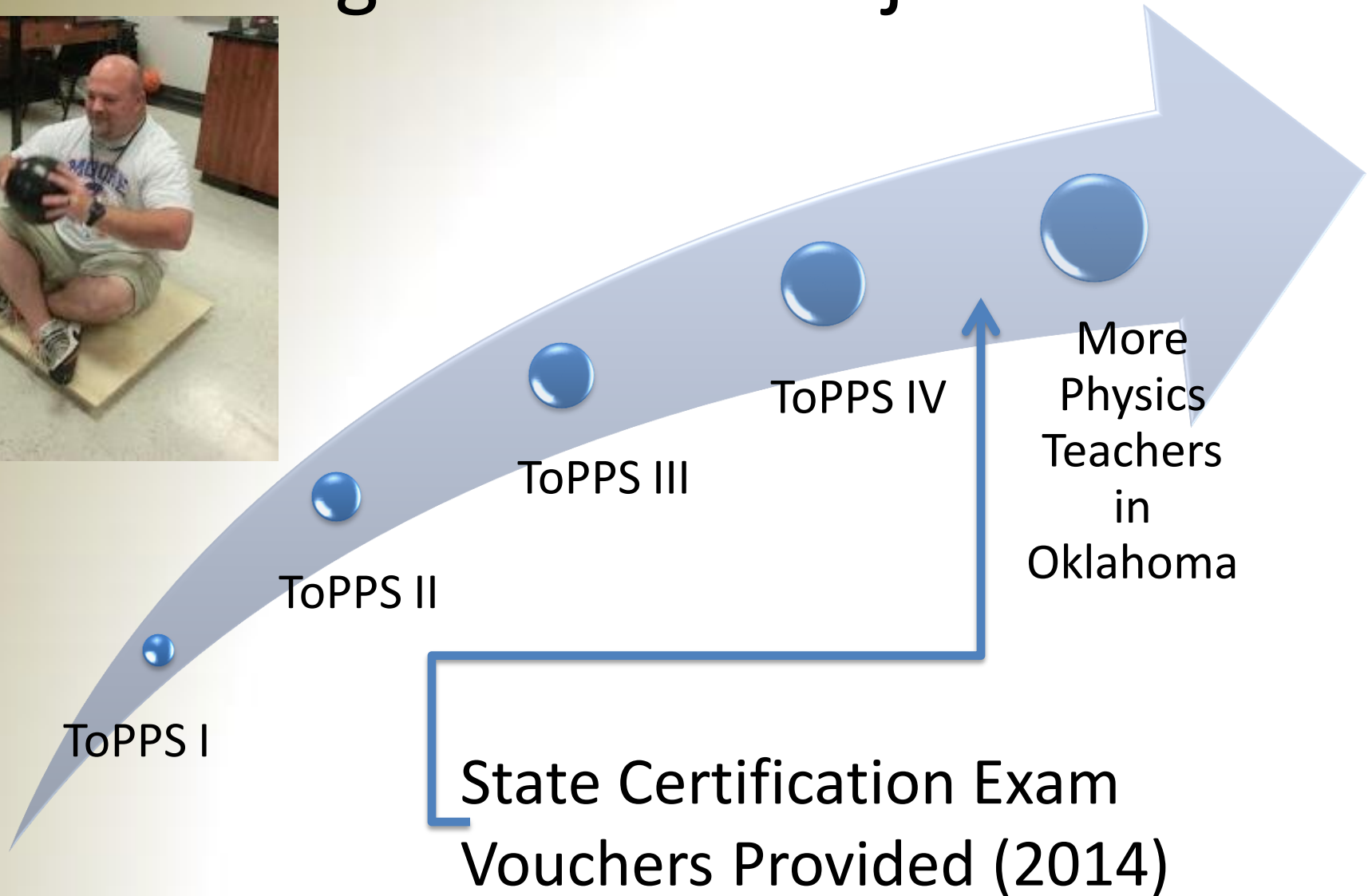
ToPPS III

ToPPS IV

More  
Physics  
Teachers  
in  
Oklahoma

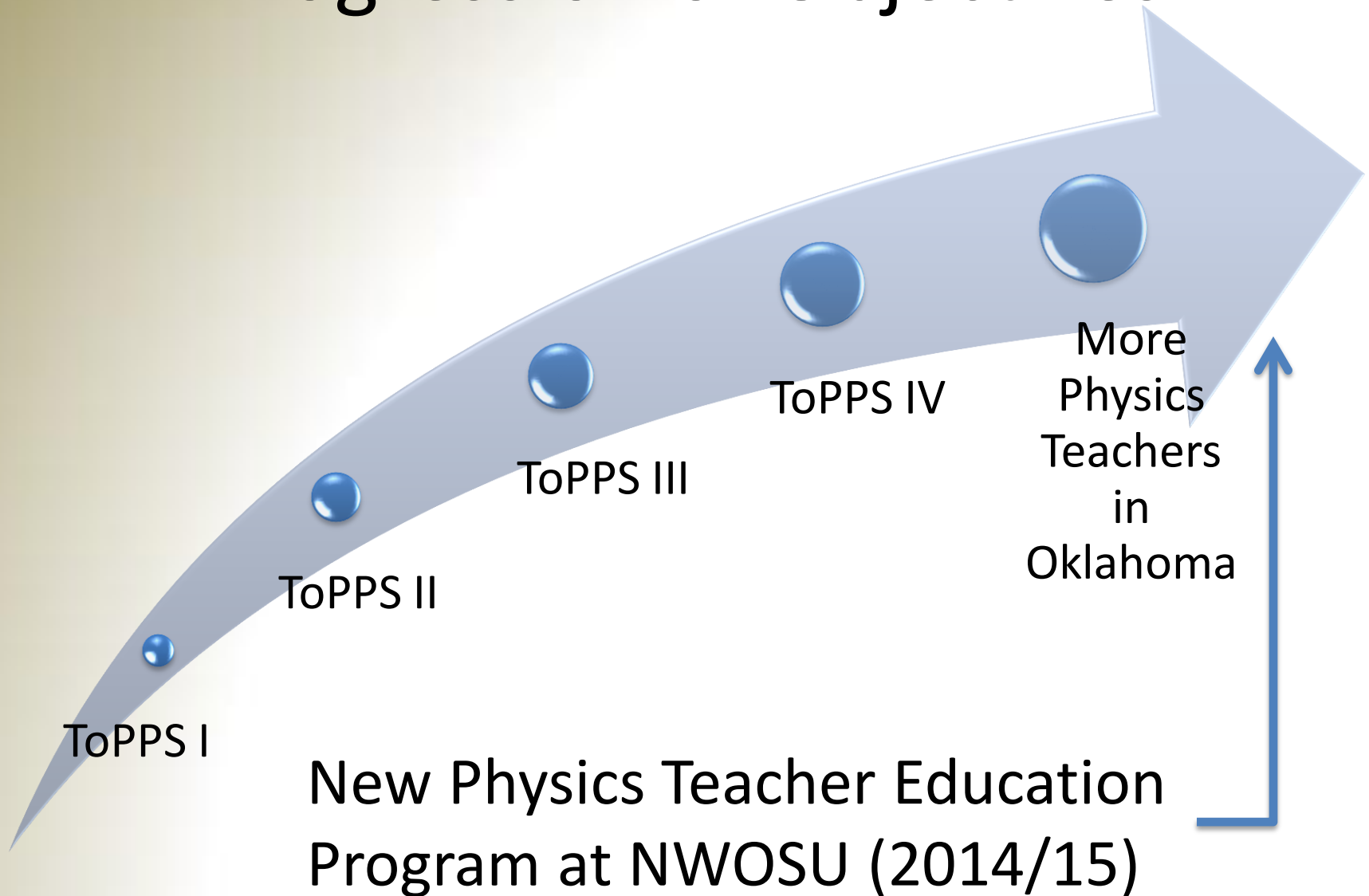
New Physical Science Faculty  
Member at NWOSU (2013/14)

# Progression of Objectives





# Progression of Objectives



# Demographics

2011



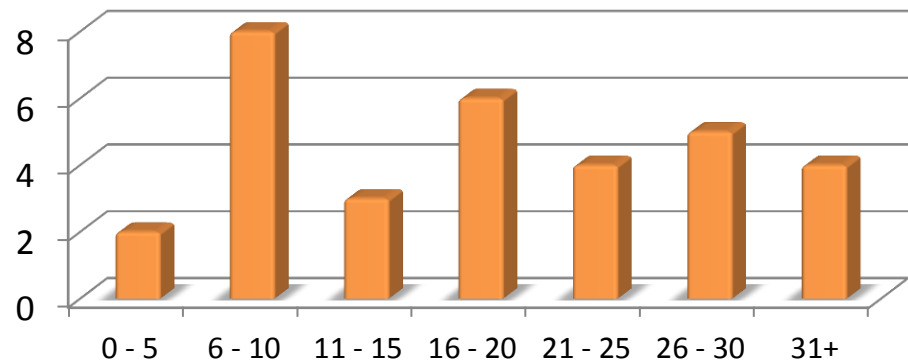
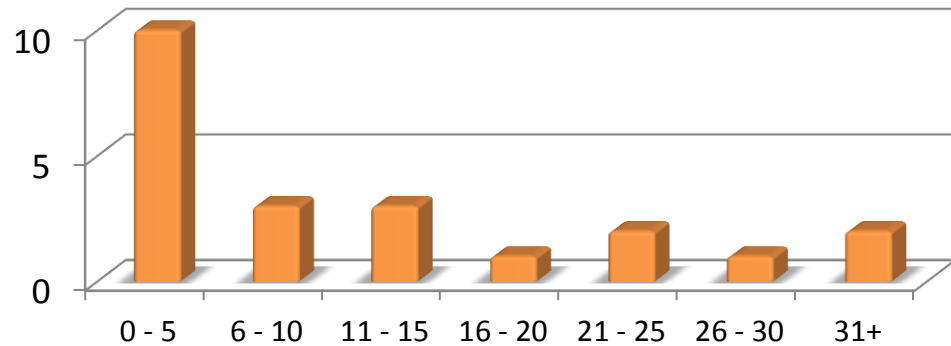
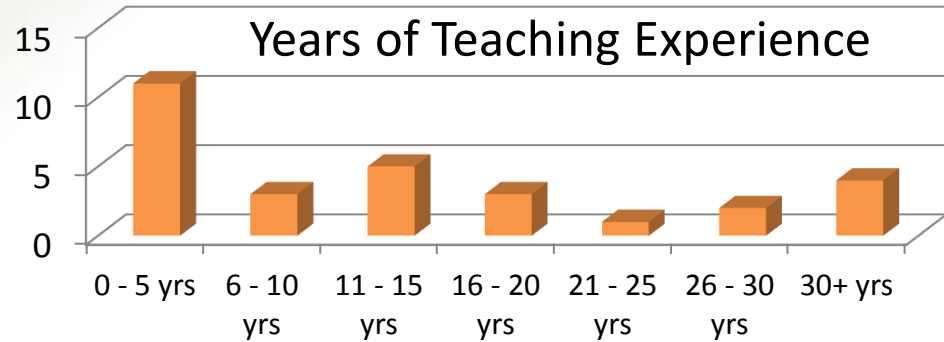
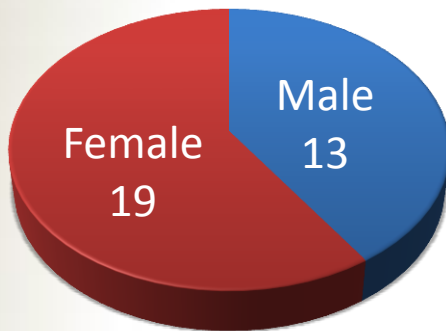
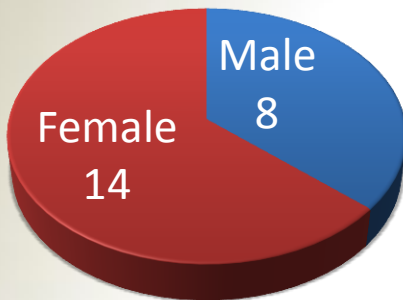
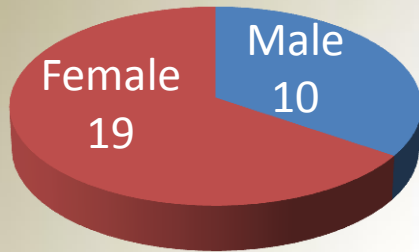
2012



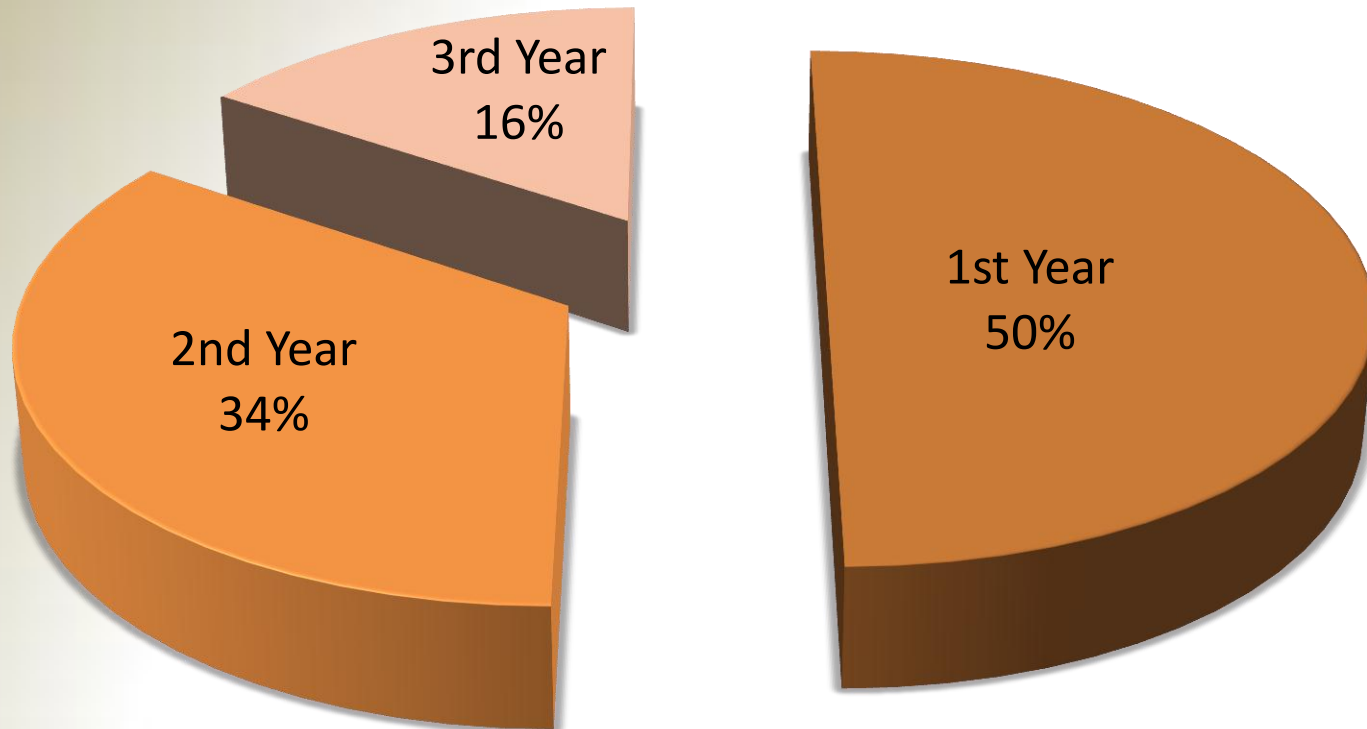
2013



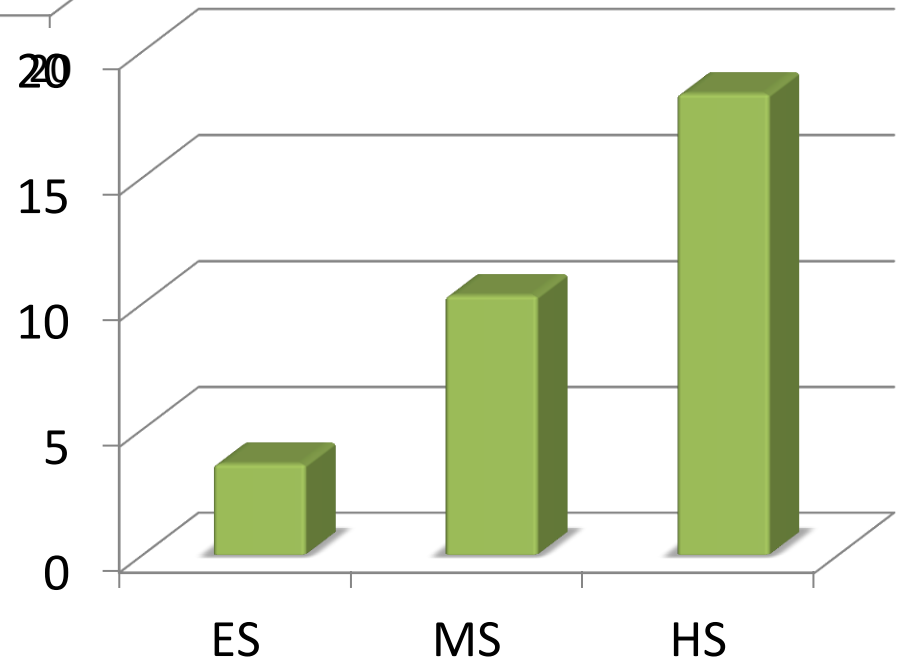
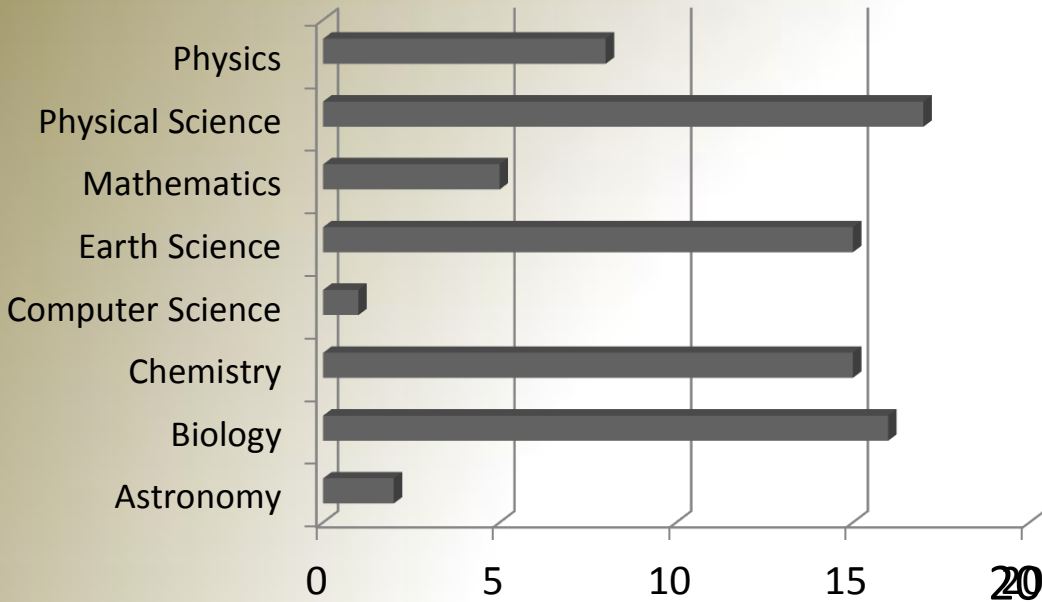
# Demographics



# ToPPS III (2013) Participants



# Demographics



Pre-test  
HS Biology Teacher

**ENERGY  
AND  
MOMENTUM**

energy  
of motion

Kinetic  
energy

$$E=mc^2$$

Potential  
energy

Stored  
energy

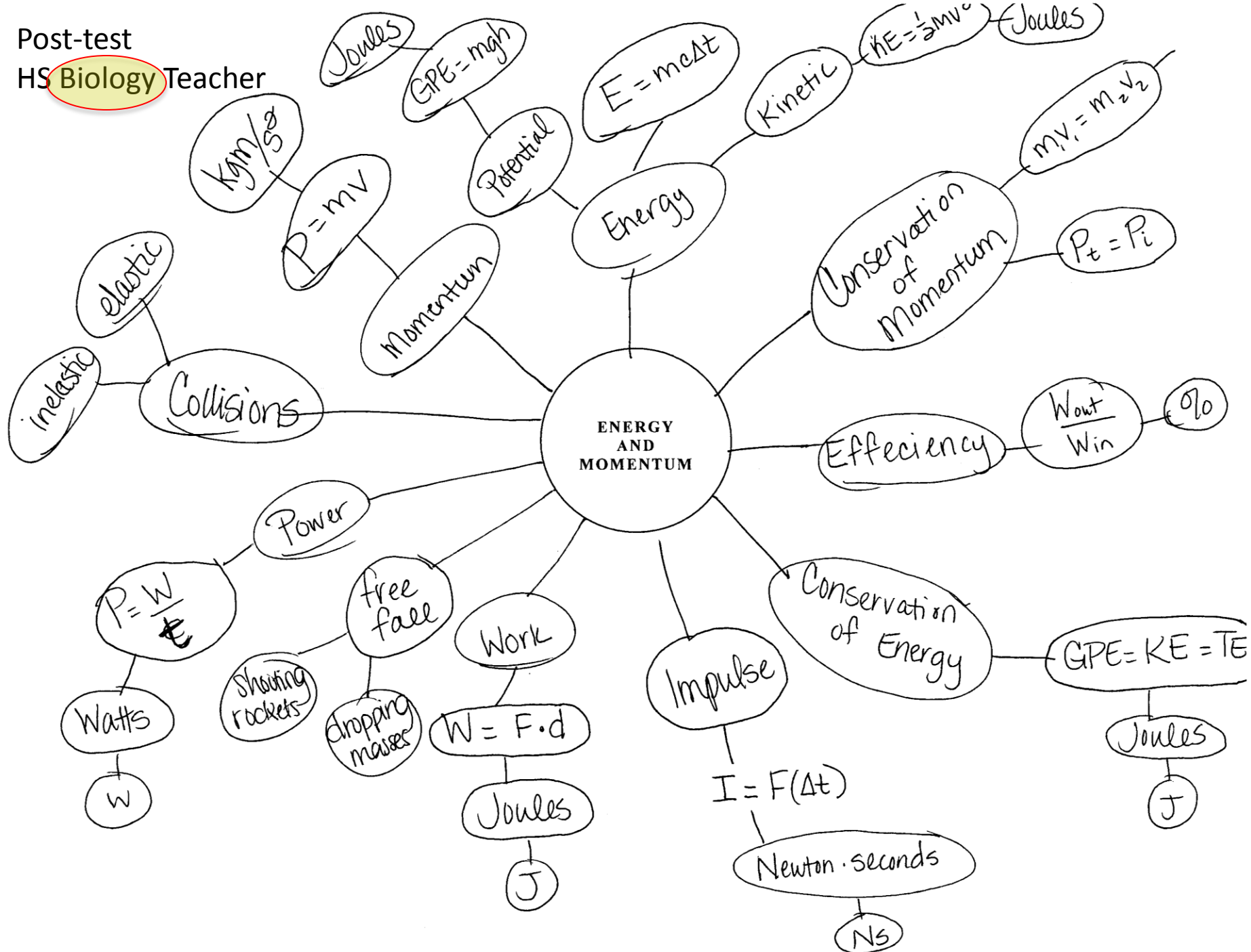
Conservation  
of energy

movement  
and  
motion

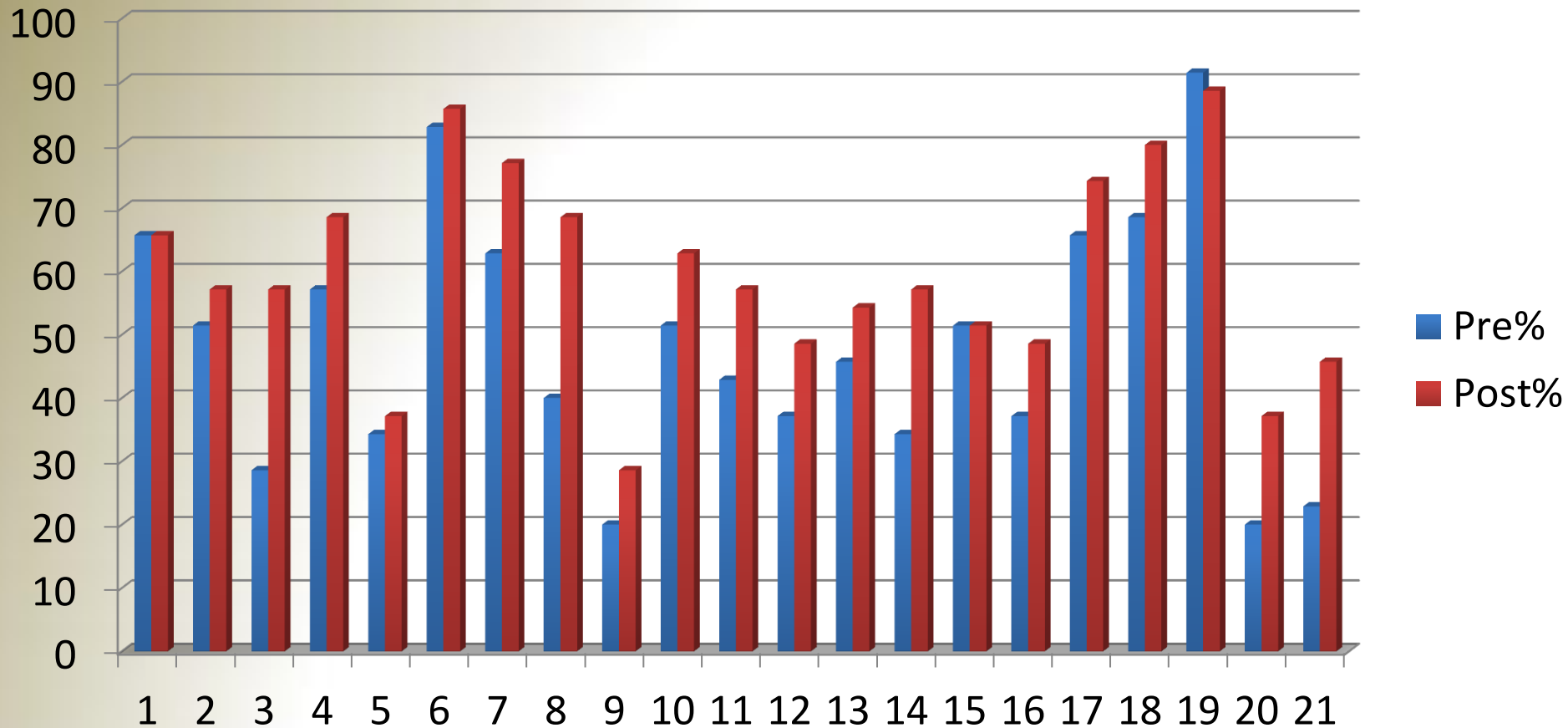
Simple  
machines

Ability  
to  
do work





# 35 Item Content Test



Paired t-test indicates a statistically significant difference between pre- and post-test ( $p < 0.05$ )

71% participants had  $> 2 * SD$  from mean (Post – Pre)

67% participants had  $> 2 * SD$  from mean “Gain”

# Long-Term Sustainability

- Other PD programs in the state
  - NSU (2013 first year)
  - Using ToPPS network to get the word out
    - Commercial workshops
    - AP Physics workshops
    - Professional society meetings
  - Modeling workshops in Norman/OKC/Tulsa area(s)?
  - Other funding sources

# Oklahoma Challenges

- Lack of engagement between the industry members and educators
- Lack of qualified employees who have the education, training and motivation for industries and STEM based professions
- Lack of rigorous and relevant STEM based education
- Lack of knowledge of the STEM based careers in general

# State STEM Strategy

- Alignment with state's STEM vision
  - State STEM Strategy published in May, 2013 around three goals
    - Ensure all students have access to STEM education opportunities
    - Ensure all students have access to highly effective STEM educators
    - Leverage stakeholder resources and partnerships to strengthen the STEM education effort of each school.
- Better prepare Oklahoma's future workforce through relevant professional development
  - Indicators of success will be developed to measure:
    - STEM Readiness of Graduates
    - STEM Access for all Students
    - STEM Teacher Recruitment, Retention, and Expertise.

# Consortium for the Advancement of Science and Math Education in Oklahoma (CASMEO)

- Non-profit organization working with education, industry, and government leaders that bridges gaps between workforce STEM demands and educational capability/capacity to strengthen Oklahoma's 21st century economy
- [www.casmeo.org](http://www.casmeo.org)



# Consortium for the Advancement of Science and Math Education in Oklahoma (CASMEO)

- Build bridges between STEM Programs , Industries and Economic Development Efforts
- Centralized Coordination and Decentralized Execution
  - Link Programs and efforts
  - Leverage Best Practices
  - Identify Results
  - Reward Successes

# Acknowledgements

- Brian Lamore, Nancy Easterly, Evelyn Restivo, Jill Lewis (PTRAs leaders)
- Karen Jo Matsler, Jim Nelson (PTRAs)
- NWOSU Administration, School of Arts & Sciences, Departments of Natural Science and Education
- Oklahoma State Regents for Higher Education
- ToPPS participants!