ASPIRING TO LEAD: A REPORT FROM THE AAPT PHYSICS MASTER TEACHER LEADER TASKFORCE

OCTOBER 18, 2017 | 1:00PM - 2:00PM | C 2010

SPEAKER

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7 12 SCIENCE, IL

JOINED BY:
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PAEMST 2014,
K-5 Science, DC

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7 12 Science, NC
Einstein Fellow on Capitol Hill
Aspiring to Lead

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AEF (2011-2013), Florida International University, STEM Transformation Institute

Brandon Helding
Boulder Learning, Inc.
Aspiring to Lead

Engaging K-12 teachers as agents of national change in physics education.

A report from the AAPT Physics Master Teacher Leader Taskforce
Aspiring to Lead
Engaging K-12 teachers as agents of national change in physics education.

PAEMST Awardees
43 Total Teachers Involved

Northwestern

Task Force Members
Advisory Members
Research & Evaluation Team

FIU
FLORIDA INTERNATIONAL UNIVERSITY

TEXAS TECH UNIVERSITY
UNIVERSITY OF NEBRASKA
# Science Education Reform

## National
- Every Student Succeeds Act (ESSA)

## State
- Teacher preparation
- Student assessment

## District
- Teacher professional development
- Teacher evaluation
- Curriculum
- Instructional Approach

## Classroom
- Teacher beliefs about purpose of science education
- Teacher self-efficacy
## Science Education Reform

**Teacher leadership is missing from the science education system and policy reform conversations.**

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<thead>
<tr>
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Needs

What our nation needs from teachers…

- Persistence
- High quality science teaching
- High quality science teacher leadership
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What **our teachers need** from the nation…

- High quality teacher preparation
- Sustained support for growth
- Recognition of teacher professional expertise
- Opportunities and invitations to be involved in decision-making about education at all levels
Needs

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What our teachers need from the nation…
- High quality teacher preparation
- Sustained support for growth
- Recognition of teacher professional expertise
- Opportunities and invitations to be involved in decision-making about education at all levels

How can the nation and the nation’s STEM teachers support each other? Teachers need situated leadership support.
Goals

Systematically identify, develop, empower, and coordinate teacher leadership to improve curriculum & instruction, and inform education policy in K-12 physics and physical sciences.

Build a model for K-12 physics education teacher leadership applicable to other disciplines.
Major Research Gaps

How can the nation and the nation’s STEM teachers support each other?

- Few opportunities for STEM teacher leadership exist (NAS, 2014).

- Teachers need situated leadership training (NASEM, 2015, pg. 200).

- The “research base on teacher leadership is not robust” (Ibid, pg. 196).
NSF’s Broader Impacts

NSF has had perhaps a greater impact on science education in the past 67 years than any other institution, agency, or policy.

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Curricular Reform
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Principle

PD&L programs must build strong Networks and Community characterized by:

- PD&L “for teachers, by teachers, ”
- Support across the career spectrum, and
- Participation from K-12 teachers, higher education faculty, and professional associations for educators.
One Project, Three Programs
Physics Master Teacher Leader Project

**Principle**

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**Priorities**

- **Mentoring & Induction** (secondary)
- **Vertical Alignment** (K-12)
- **Program Support & Advocacy** (K-12)
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**Programs**
- TPreP Teacher Preparation and Retention Program
- PALs Physics at All Levels
- TLAA Teacher Leader Agency and Advocacy

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Programs
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Emerging Teacher Leaders
Transforming Teacher Leaders
### Instructional Leadership Performance Indicators

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<tr>
<th>Broad Mindsets</th>
<th>Emerging</th>
<th>Transforming</th>
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<tbody>
<tr>
<td>Their pedagogical knowledge is current and comprehensive</td>
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<td>They actively seek pedagogical collaboration and feedback</td>
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<td>They mentor new teachers and provide ongoing support</td>
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<td>They advocate for professional development opportunities</td>
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<td>They effectively advocate for student and teacher success</td>
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<tr>
<td>They advocate for curriculum development and implementation</td>
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<tr>
<td>They engage in research-based practice for professional growth</td>
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<tr>
<td>They participate in learning communities and work collaboratively</td>
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<tr>
<td>They use collaborative learning groups to address the needs of all students</td>
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<tr>
<td>They integrate student-relevant and appropriate curriculum into teaching</td>
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<tr>
<td>They seek and are aware of financial, technological, and curricular resources that support their teaching</td>
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### Association Leadership Performance Indicators

<table>
<thead>
<tr>
<th>Broad Mindsets and Beliefs</th>
<th>Emerging</th>
<th>Transforming</th>
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<tbody>
<tr>
<td>They understand that policy is the regulation and allocation (and reallocation) of resources</td>
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<tr>
<td>They understand how to translate best practices from their classrooms into viable policy solutions (or, conversely, use policy to solve problems that exist in their classrooms)</td>
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<tr>
<td>They understand how to effectively advocate for good policy solutions</td>
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<tr>
<td>They understand the interplay between policy and politics, and understand how to navigate situations that require one, the other, or both</td>
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<tr>
<td>They have a strong network of professional contacts that can help them accomplish their policy/advocacy goals</td>
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<tr>
<td>They are comfortable engaging with legislators and are willing to invite policy makers into their classroom (in-person or through video, interviews, and anecdotes) to provide firsthand experiences of master teachers</td>
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<tr>
<td>They understand both current policy as well as the way the policy came to be and the issues it intended to address</td>
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<tr>
<td>They recognize that policy change is an iterative, long-term process that often includes obstacles such as setbacks and inappropriate timing, audience, etc.</td>
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</table>

### Policy Leadership Performance Indicators

<table>
<thead>
<tr>
<th>Broad Mindsets</th>
<th>Local</th>
<th>State</th>
<th>National</th>
</tr>
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<tbody>
<tr>
<td>They understand the context of and implements local policy to the benefit of the education of students</td>
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<tr>
<td>They identify local policy and the difficulties (struggles, issues) that appear in the classroom as a result of “bad” policy</td>
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<tr>
<td>They identify local point persons who are levers for policy change (department chair, principal, superintendent, board members, colleagues)</td>
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<tr>
<td>They maintain an open-door classroom to keep a two-way conversation with policy makers</td>
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<tr>
<td>They understand the context of and implements state policy</td>
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<tr>
<td>They identify state policy and the difficulties (struggles, issues) that appear in the classroom as a result of “bad” policy</td>
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<tr>
<td>They identify state-level point persons who are levers for policy change (State Board of Education, state science supervisors, etc.)</td>
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<tr>
<td>They understand the context of and implements national/federal policy</td>
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<tr>
<td>They identify national policy and the difficulties (struggles, issues) that appear in the classroom as a result of “bad” policy</td>
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<tr>
<td>They identify national/federal-level point persons and agencies that are levers for policy change (Department of Education, National Science Foundation, etc.)</td>
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### Attitudes and Skills

<table>
<thead>
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<tr>
<td>Recognizes that educational policy is more than legislation, and results in implementation (i.e. school district rules, curricular guidelines, standards, assessments, union rules, and historical tendencies)</td>
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<tr>
<td>Recognizes other teachers who are policy leaders</td>
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<tr>
<td>Knows how to shift from problem-focused to solution-focused thinking in regard to policy</td>
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<tr>
<td>Recognizes that teacher voice is both necessary and credible in policy discussions</td>
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<tr>
<td>Engages in policy work alongside teachers who have experience in policy leadership (as a support to others, and then later as a guide to others)</td>
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<tr>
<td>Generates ideas through innovative thinking about policy, and to share those ideas with stakeholders</td>
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<tr>
<td>Makes new pathways for teacher voice in policy discussions directly and/or with support of advocates</td>
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### One Project, Three Programs

**Physics Master Teacher Leader Project**

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<td><strong>Audience/Format</strong></td>
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<tr>
<td>- PhysTEC graduates and master teachers (paired)</td>
<td>- K-6 and 7-12 teachers (paired)</td>
<td>- K-12 teachers (state-based cohorts)</td>
</tr>
<tr>
<td>- Multi-year cohort</td>
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**Elements**

- Mentoring by master
- Implementation of research-based, discipline-specific teaching strategies
- Induction into physics education community
- **Instructional leadership activities**
  - Mentoring by peers
  - Implementation of research-based, discipline-specific teaching strategies
  - Induction into physics education community
  - **Association/Instructional Leadership activities**
  - DC-based policy training
  - State-level and/or local advocacy work
  - Support of K-12 physics education teacher leadership programs
  - **Policy Leadership activities**
Teacher leadership is missing from the science education system and policy reform conversations.

### National
- Every Student Succeeds Act (ESSA)

### State
- Teacher preparation
- Student assessment

### District
- Teacher professional development
- Teacher evaluation
- Curriculum
- Instructional Approach

### Classroom
- Teacher beliefs about purpose of science education
- Teacher self-efficacy
Teachers are leading the science education system and policy reform conversations.

**National**
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- Teacher beliefs about purpose of science education
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How do we systematically identify, develop, empower, and coordinate teacher leaders to improve curriculum and instruction and inform education policy in K-12 physics and physical science education?
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Teacher Leader Network Analysis

- Social habitus
- Social capital
- Context

“Distributed Cognition”
How do we systematically identify, develop, empower, and coordinate teacher leaders to improve curriculum and instruction and inform education policy in K-12 physics and physical science education?
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**Teacher Leader Network Analysis**
- Social habitus
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**Teacher Leader Analysis**
- Leadership capacity
- Leadership types

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**Teacher Leader Analysis**
- Leadership capacity
- Leadership types
  - Instructional
  - Association
  - Policy

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**Teacher Leader Network Analysis**

- social habitus
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“Distributed Cognition”

**Teacher Leader Analysis**

- Leadership capacity
- Leadership types
- instructional
- association
- policy
- self-efficacy
- behavior
Intellectual Merit

Teacher Leader Network Analysis

social habitus
social capital
context

“Distributed Cognition”

Teacher Leader Analysis

Leadership capacity
Leadership types
instructional
association
policy
self-efficacy
behavior
1. How do we identify teacher leaders?
2. How do we measure dimensions of characteristics in the context of K-12 physics teaching?
3. How do we support groups of teacher leaders?
4. How does context influence teachers’ differential success?
1. What essential characteristics define personas of teachers who demonstrate high potential for leadership?
2. What can prepared teacher leaders do?
3. How does teacher efficacy change as a result of leadership growth?
4. How does teacher behavior in each dimension change?

Teacher Leader Network Analysis

social habitus
social capital
context

“Distributed Cognition”

person-based research

Teacher Leader Analysis

Leadership capacity
Leadership types
Instructional
Association
Self-efficacy
Policy
Behavior
Multi-Level, Multi-Methods Approach

Network Analysis

Personas

Multi-Methods across PROJECT and PROGRAMS

- Case studies / Tracking successes
- Phenomenenography (persona-based research)
- Surveying (physics and physics teaching self-efficacy, identity, teaching and work experience, network survey)
- Latent class analysis
- Classroom observations
- Participant artifacts (journals, teacher project proposals, professional development deliverables)
- Student artifacts
Expected Outcomes

1. Empirically-tested models of teacher leadership development transferrable to other disciplines
2. Development of teacher leaders with strong physics and physics teaching identity
3. Development of networked, supported groups of teacher leaders
4. Enhanced perception—and reality—of teachers as leaders
5. Persistence in the profession
6. Improved quality of K-12 physics education
Broader Impacts

- Builds self-sustaining leadership
- Incorporates K-8 community
- Incorporates Higher Education community
- Reaches out to underrepresented groups
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- Incorporates K-8 community
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Some Potential Partners
Feedback Requested

The task force seeks input on how to most effectively drive a research program that:

- Investigates the development and outcomes of teacher leader networks in each of the three identified priority areas:
  
  ○ Mentoring and Induction (TPReP)
  
  ○ K-12 Vertical Alignment (PALs)
  
  ○ Program Support and Advocacy (TLAA)

  and...

- Investigates the interplay among these three networks.
Thank You!

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Contact

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