Self-Directed Online Teacher Professional Development: Applying the Research for Effective and Scalable Learning Communities

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Assistant Executive Director
e-Learning and Government Partnerships
National Science Teachers Association

Ed Tech Leadership 2012, Roanoke, VA
National Science Teachers Association

- Non-Profit Membership Association
- 5 Conferences/year (~22,000 teachers/16 days)
- NSTA Press (~20-30 Books/year)
- 4 separate NSTA Journals (~5,500 lesson plans)
- K-12 e-Teacher Network (~430,000 teachers)
  - 3 monthly thematic e-newsletters
  - Weekly NSTA Express newsletter
  - NSTA SciLinks
  - NSTA Learning Center

...to promote excellence and innovation in science teaching and learning for all.
Focus of Session

- Review of Existing PD Landscape and Challenges with Scale
- Overview of content, tools, community integration, and recognition/reward system
- Review of Impact Studies and Research Findings
US Professional Development Landscape: Elementary and Middle Level Teachers of Science

Vast majority of K-8 teachers have general education degree, not in science or science education

There are approximately 1.6 million elementary teachers in United States

At middle school level (grades 5-8), large percentages of teachers “within-field” teaching “out-of-field”
Teacher Knowledge

- A significant, *positive* correlation exists between *student achievement* and *teachers’ content knowledge* (subject matter & pedagogical content knowledge)

- Detrimental effects occur when teachers do not feel confident in science

The US Professional Development Landscape

What we know—Local Systemic Change K-8 Evaluation: (75,000 data points -10 yr NSF Longitudinal study)

Teachers of Science with less than 16 hours of PD in last year:

– What % at K-4 level? 76%
– What % at 5-8 level? 57%
– What % at 9-12 level? 32%

Research calls for 50-80 hours/year to effect a change in teacher practice.

Through online learning systems, teachers may enhance their learning through blending the best of onsite PD with online PD that provides immediacy, convenience, self-direction, and collaboration with other colleagues and experts via professional learning communities.

For teachers to effectively facilitate using interactive resources, learning systems, and connectedness to online communities, teachers need to experience it firsthand—as part of their own learning and professional development.

A Critical Piece of the Teacher Learning Solution

- Self-Directed Access
- 10,100+ resources
- Free tools to help teachers diagnose, organize, personalize, and document their learning
- Immediate free access to online advisors and colleagues through chat and discussion

http://learningcenter.nsta.org
Teacher indexes learning needs

Resources, and opportunities suggested

Teacher selects based on unique needs/preferences. Creates Growth Plan

Self directed study

Joins others

Group discussion online

Knowledge assessment

Analytical Research Database

Into Teacher Portfolio

Live Online Advisor “Help desk” and email Content Mentors

Takes moderated course

Professor for graduate credit online
Nov 2012 Collection: **10,100+** PD Resources and Opportunities Available

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<tr>
<th>Do-It-Yourself Learning</th>
<th>Live Online Seminars &amp; Classes</th>
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<tbody>
<tr>
<td>SciGuides [42]</td>
<td>Web Seminars [120+/yr]</td>
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<td>Short Courses [20+/year]</td>
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<tr>
<td>SciPacks [25]</td>
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<td>Archived Seminars/Podcast [1,670+]</td>
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<th>Books &amp; Articles</th>
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<td>Symposia [6-10/year]</td>
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<td>PD Institutes [6-10/year]</td>
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<tr>
<td>e-Chapters [1,800+]</td>
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</table>

Resources tagged to filter or sort by learning preference
Teachers are adding over 963,000 resources across their personal libraries from the 10,000 assets available with a strong growth trajectory!
Learning Center
Selected Tools to Facilitate Personalization

Flavio Mendez
PD Indexer and The PD Plan and Portfolio

• Diagnose gaps in Content Knowledge Understanding

• View Resources and Opportunities for Consideration

• Add to your Plan
<table>
<thead>
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<th>Pre and Postassessment</th>
<th>No. of Items</th>
<th>No. of Cases</th>
<th>Internal Consistency*</th>
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<tr>
<td>Plate Tectonics</td>
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Category: My Content Knowledge
Goal: Cell Differentiation: Depth of Understanding
My Tasks: Define Evidence

Instructions and How-To Animations

Identified Professional Development Resources

<table>
<thead>
<tr>
<th>PD Resource to Address Goal</th>
<th>Note</th>
</tr>
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<tbody>
<tr>
<td>Cell Division and Differentiation: Continuity of Life</td>
<td>I am a middle level teacher, now responsible for 3 preps, and am teaching in an area with little experience</td>
</tr>
</tbody>
</table>

Expected Date of Goal Completion
6/1/2011

Goal Statement
- Empty - Add information

Why I chose this goal, and where I am now
- Empty - Add information

Standards
My Library

Over 7,400 collections available

Rate and share public collections

Upload and share your own resources

2 GB free space!
Learning Center
Community
Building a Vibrant Learning Community

- Psycho-emotional Roles for Growth and Recognition
- Compelling Content
- Social Engagement Opportunities
Wendy Ruchti
Wendy Ruchti has been part of the Educational Foundations Department at Idaho State University’s College of Education since 2008. She received a PhD in Education from the University of Idaho in 2005 with an emphasis in curriculum and instruction in STEM education. At ISU, she has taught several educational foundations courses. Her research interests include elementary science education and creating collaborative online learning environments. Before coming to ISU, she taught middle school science and math.

Lara Smetana
Lara Smetana is an assistant professor of science education at Southern Connecticut State University. She brings classroom experience as an 8th grade physical science teacher and has worked with a variety of informal education programs across the country. Lara teaches courses in elementary science methods and educational technology and mentors student teachers. Her research interests include pre- and in-service teacher education and the use of educational technology in science teaching and learning.

Kathy Sparrow
Dr. Kathy Sparrow is currently an adjunct professor at Florida International University (FIU), teaching Elementary Science Methods. She previously worked as a middle and high school science teacher as well as the Science Supervisor for Akron Public Schools. She was a Regional Director for SECO, served on the NSTA Board of Directors and was president of the National Science Education Leadership Association (NSELA). Kathy was also awarded the Outstanding National Science Supervisor Award in 1999.
Growth across all discussions

- 13 Forums
- 1,322 Topics
- 15,553 Posts
- Physical, Life, Earth/Space
- Pedagogy
- Evaluation/Assessment
- Research in Science Ed
- Technology Integration
- NGSS

I recently attended the Conference for the Advancement of Science Teaching in Dallas, Texas. While I was there I had the opportunity to hear Jon Bergman speak about a model of teaching that his department has pioneered called the flipped classroom. In this model, students watch high quality teacher made instructional videos as homework and spend class time practicing content through activities, practice problems, and labs. Lecture becomes homework and practice becomes class work, hence the term "flipped". I was instantly amazed at the way this model provided for differentiation among students, time for remediation, and student driven learning. It seemed to address all of the issues I had been facing in my own classroom. I have resolved to try it out in my classroom in the coming semester. I would love to hear any opinions, concerns, or questions that you might have about the Flipped Classroom.

I am a big proponent of the flipped classroom. Although not widely embraced in my county as of yet, I discovered that using this model in my classroom increased scholar interactions with one another. I was able to work with small groups, serving as a ‘guide on the side’ instead of the ‘sage on the stage’. As a learning coach, I could walk around the room and ask questions, while encouraging the scholars to be more responsible for their own thinking and learning. My scholars were eager to help one another instead of relying on me. On our county’s benchmark assessment for first quarter, my classes scored higher overall than any other classes in our area of the district (about ten schools).

My scholars all have iPads, so this past quarter, I posted information to our class
Learning Center
Recognition and Rewards
Welcome to Your Personalized Learning Web Space!

Albert, you've already earned 2765 Activity Points!

You've recently earned: Platinum Indexer, Complete Indexers
You're close to earning: Diamond Commenter, Post 25 more comment/questions

UPDATE YOUR PROFILE  CHECK THE LEADERBOARDS

With these resources you can build your professional development plan, track your activities and assess your progress. You can start at "Explore Learning Opportunities" below or by creating your game plan with the PD Plan and Portfolio tool. You may also review an archived Web Seminar or a multimedia overview of the Learning Center.
Follow your top colleagues' online activity and contributions

**Top Commenters**

Building a worthwhile learning community provides opportunities for you to recognize those leaders that share their ideas, lessons and resources. The top commenters are those that contribute their voice in the Community Forums. [Join the dialog!](#)

<table>
<thead>
<tr>
<th>Pos</th>
<th>Name</th>
<th>Commenter Points Earned</th>
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<td>Angelika Fairweather</td>
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<td>LeRoy Attes</td>
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<td>Lorrie Armfield</td>
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<td>Bambi Bailey</td>
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<tr>
<td>7</td>
<td>Allison Cooke</td>
<td>1,980</td>
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Testimonials from teachers, administrators and professors

**Pre-Service Methods Professor:** I have to admit that I was skeptical about the points/badges system working with my students, but I was SO-O-O-O-O wrong! I simply put an announcement on Blackboard praising the top folks to date over the weekend. I didn't even think about the fact that the only man in one class had the overall top points. Several young women announced, "We can't let Terry get away with that!" And so it began.... Sally mocked them for not checking their profile page for updates on their points...I haven't met with my other class yet, but they too have upped the ante. I don't know what their reason is. I just know that a small group has infected the larger group.

Recognizing Teacher Learning and Leadership

- Provide opportunities to build reputation and contribute to the community and as part of your own personal growth
- Over 36,000 badges earned in 2011-2012

Administrator: One of our teachers sent the following information after receiving a note from NSTA that stated: Congratulations! You have been selected as the NSTA Learning Center Top Advocator for the week of May 28 – June 3, 2012. She was delighted and wrote, "Look at what I got in my email! ...NSTA picked me!! It's all because of you ladies that I started this science journey in the first place! Thank you!!
Below is a list of activities you can do to earn badges as recognition for your efforts as you aggregate, review, and share your personal and NSTA e-PD resources. You also earn badges for making posts in the community forums, for diagnosing your needs in science content, and by attending web seminars, and successfully completing SciPacks.

**Complete and pass a SciPack final assessment**

100 Activity Points (AP)

*View the SciPacks*

- SciPack Activator - Complete 1 SciPack and pass the Final Assessment
- SciPack Optimizer - Complete 3 SciPacks and pass the Final Assessment
- SciPack Accelerator - Complete 6 SciPacks and pass the Final Assessment

**Complete all SciPacks within Physical Science**

1000 Activity Points (AP)

*View the SciPacks*

- PS SciPack Ultimater - Complete all SciPacks within Physical Science

**Complete all SciPacks within Life Science**

1000 Activity Points (AP)

*View the SciPacks*

- LS SciPack Ultimater - Complete all SciPacks within Life Science

**Complete all SciPacks within Earth and Space**

1000 Activity Points (AP)

*View the SciPacks*

- ES SciPack Ultimater - Complete all SciPacks within Earth and Space Science
Learning Center
Selected Content Resources
Animation Analysis

The following animation shows a ball rolling along a track. Replay the motion a number of times and then answer the multiple-choice questions that follow. In answering those questions, feel free to replay the animation if necessary. Select the icon to launch the animation in a new window.

Figure 5.2. Ball on Complex Track Animation
For those unable to engage with the interactive component, select this link for a long text description: Text Description

Practice

Okay, now that those mental wheels are turning, see if you can answer these questions. If you miss an answer or two or three, it might be worth your while to review the appropriate sections of this Science Object.

Q: What is the approximate position of Point E in relationship to Point A?

- E is about 350 centimeters away from A, at an angle of about 80 degrees with respect to Line Y.
Interactive Learning beyond Narrative and Images

Which of the following best describes the concept of inertia?

- Inertia is just a name that describes the fact that an object obeys Newton’s first law.
- Inertia is sort of an “internal force” that actively resists changes in motion. For example, when you try to push something, its inertia pushes back on you.
- Inertia is something that pushes an object along once you have thrown and released it.
- Inertia is something an object has when it is moving, an object loses its inertia.

If a force is exerted on an object, you can be sure the object will accelerate.

Check Your Thinking

False. In order to figure out whether or not an object will accelerate, you must determine the net force acting on it. It’s possible that the force in question is balanced out by another force, leading to zero net force and zero acceleration.
Over 260 free Simulations and Animations

- **NSTA SCIENCE SIMULATION: Make a Reef**
  - Control Panel:
    - pH: 7
    - Temperature: 23 - 25°C
    - Light: Clear
    - Salinity: 25 - 40 ppt

- **NSTA SCIENCE SIMULATION: Seismic Waves**
  - Control Panel:
    - Riggidity: High
    - Velocity: Slow

- **NSTA SCIENCE SIMULATION: Air Track**
  - Control Panel:
    - Piston Force: 1 N
    - Cart A Mass: 1 kg
    - Cart B Mass: 1 kg

- **NSTA SCIENCE ANIMATION: Angles & Distance**
  - Control Panel:
    - Distance: 0000 m
    - Direction: N

- **NSTA SCIENCE ANIMATION: Velocity & Speed**
  - Control Panel:
    - Average Speed: Speed

- **NSTA SCIENCE SIMULATION: Vertical Balloon**
  - Control Panel:
    - Balloons: 3
    - Washers: 2
NSTA SciPacks

3-5 Science Objects

10-Hour, self-directed, inquiry-based learning experience

Assessment and Certification

Content Mentor
Email Support

Pedagogical Implications
Social engagement

We offer 120 free live web seminars during the school year.
Learning Center

Web-accessible Reports to Document Community Activity and Teacher Learning

Al Byers
11958 total SciPack final assessments finished to date. 7449 passed.

### Force and Motion Assessment
- 1626 Pre-tests taken with a 56% avg score
- 549 Post-tests taken with a 67% avg score
- Totals as of 6/7/2012

### Energy Assessment
- 1108 Pre-tests taken with a 66% avg score
- 373 Post-tests taken with a 78% avg score
- Totals as of 6/7/2012

### Oceans Effect on Weather and Climate Assessment
- 653 Pre-tests taken with a 57% avg score
- 228 Post-tests taken with a 69% avg score
- Totals as of 6/7/2012

The graphs show the average scores for pre and post assessments for each quarter from 6/7/2011 to 3/7/2012.
State and District Collaborations

- Over 140 unique private/public learning communities across State and District Partnerships using the Learning Center in various blended teacher learning models as of July 2012
- See dozens of administrator, university, and teacher testimonials

http://learningcenter.nsta.org/impact/testimonials.aspx
Blended Professional Development

- Integration between Onsite and Online Learning

- Involves the mix of *pedagogical strategies* in combination with various *modes and mediums* leveraging *technology-mediated solutions* to maximize desired learning outcomes

(Kim, Bonk & Oh, 2008; Lockee, BB., Moore, M., Burton, J., 2001; Smith & Kurthen, 2007; Tang & Bryne, 2007; Vaughan, 2007; Verkroost, Meijerink, Lintsen, & Veen, 2008; Yoon & Lim, 2007)
Learning Center
Impact Studies and Research

http://learningcenter.nsta.org/research/

Al Byers
Research and Dissemination

• **Quasi-experimental Design Study:** Across 3 districts finding *significant gains in teacher content knowledge using single SciPack*. (2008). n=45, teachers in grades 5-8

• **Experimental Design Study:** Pretest-posttest delayed-treatment/control group design with random assignment finds *significant gains in teacher content knowledge, teacher self-efficacy, and students’ gain scores for grades 5-8 in treatment group across two Sci Packs*. (2009-2010), n = 56

• **Descriptive Study:** Dissertation research finds *significant gains in teacher learning* for pre-posttest and pretest-final assessment. (2010). n = 85, teachers grades 3-6 from 11 different states.


See: [http://learningcenter.nsta.org/research/](http://learningcenter.nsta.org/research/)
The NSTA Learning Center

**Purpose:** To enhance the personal learning of teachers by providing a suite of tools, resources, and opportunities to support their individual long-term professional growth based on their unique learning needs and preferences and within a professional learning community.

http://learningcenter.nsta.org/impact
On the Horizon: Teacher Learning Journeys!
Self-Directed Online Teacher Professional Development: Applying the Research for Effective and Scalable Learning Communities

Questions?

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