PARTNERSHIP FOR AMBITIOUS SCIENCE TEACHER LEADERS

PASTL is a unique collaboration between Puget Sound ESD, Olympic ESD, Northwest ESD, University of Washington’s Ambitious Science Teaching Development Group, the Physics Education Research Group at Seattle Pacific University, Federal Way School District and Bellevue School District.

201 Summer Institute Summary

This summer, 50 science teachers participated in a cross-district/cross-regional two-week summer institute purposed at developing the Partnership for Ambitious Science Teacher Leaders, “PASTL”, a Math-Science Partnership Grant-funded project. Teachers experienced, learned and began collaborating around a set of high-leverage teaching practices, aligned to NGSS, that support teachers in developing a highly rigorous and equitable learning environment.

Teacher Learning was Focused on Seven Elements of Ambitious Science Teaching

1. **Anchor Learning:** Teachers anchor students’ on-going learning experience in the press to understand complex and puzzling science phenomena.

2. **Students’ Ideas Used as Resources:** Students’ everyday ideas, experiences, and questions are treated as resources for the classroom community to advance everyone’s thinking.

3. **Complex Understandings Get Built Over Time:** Learning experiences are sequenced to help students build toward cumulative understandings of “big science ideas.”

4. **Talking is Thinking:** Teachers provide varied opportunities for students to reason through talk.

5. **Students Engage in Science Practices for Purpose:** Students are apprenticed into using ensembles of scientific practices to test ideas they believe are important to their developing explanations and models.

6. **Making Thinking Visible and “Working on Ideas” Together:** Student thinking is made visible and subject to critique by the classroom community

7. **Scaffold Talk, Writing & Participation:** Students have access to specialized tools and routines that support their attempts at science-specific forms of writing, talk, and participation in activity. Everyone participates, no one is left behind.
WHAT TO EXPECT DURING THE SCHOOL YEAR

You should see your students doing more...
• Talking, modeling and explaining science ideas to make sense of complex real-world phenomena.
• Student-to-student talk purposed at asking questions, and interpreting data to re-think their initial science ideas and explanations.
• Students developing explanations for how and why a science phenomenon happens.
• Engaging in productive struggle to develop understanding about complex science phenomena.

You should see students doing less...
• Memorizing vocabulary and regurgitating facts
• Copying tons and tons of notes

Teachers will begin to...
• Shift their role from “answer giver” to “learning facilitator” or “discussion coordinator”
• Structuring units of instruction around real-world phenomena.
• Trying out strategies, scaffolds and systems to support rigorous student science talk.
• Eliciting and instructionally responding to student thinking over the course of a unit.
• Continuously engaging in formative assessment practices where students assess their own learning.
• Collaborate in a networked community to deepen their understanding of Ambitious Science Teaching Practices.

2015-16 JOB-EMBEDDED PROFESSIONAL DEVELOPMENT DAYS

Participating teachers will attend 5 job-embedded professional development days in the 2015-16 school year.

<table>
<thead>
<tr>
<th>Reflective Planning Day 1</th>
<th>September 29</th>
<th>October 13</th>
<th>October 20</th>
</tr>
</thead>
<tbody>
<tr>
<td>Studio Day 1</td>
<td>November 3</td>
<td>November 17</td>
<td>November 10</td>
</tr>
<tr>
<td></td>
<td>December 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Nov 19* Bellevue</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reflective Planning Day 2</td>
<td>January 12</td>
<td>January 19</td>
<td>January 21</td>
</tr>
<tr>
<td>Studio Day 2</td>
<td>February 23</td>
<td>February 25</td>
<td>February 4</td>
</tr>
<tr>
<td></td>
<td>March 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>March 7* Bellevue</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reflective Planning Day 3</td>
<td>March 23</td>
<td>March 14</td>
<td>March 17</td>
</tr>
</tbody>
</table>

PASTL Summer Institute Summary 2
ONGOING COLLABORATION

Throughout the school year, the PASTL team will support teachers through personal email communication, via the AST Facebook site and through closed virtual sharing spaces (under construction) on the Ambitious Science Teaching website. Through these means, we hope to collaboratively develop, share and reflect on common tools and resources aligned to the AST framework and the NGSS.

PASTL Team
Karin Lohwasser (UW), loh2o@uw.edu
Mark Windschitl (UW), mwind@uw.edu
Jessica Thompson (UW), jthomps@uw.edu
Carolyn Colley (UW), cdawson1@uw.edu
Christie Barchenger (UW), cbarchen@uw.edu
Abby Daane (SPU), Abigail.daane@gmail.com
Stamatis Vokos (SPU), vokos@spu.edu
Rachel Scherr (SPU), rescherr@gmail.com
Kat Laxton (UW | PSESD), klaxton@psesd.org
Brian MacNevin (NWESD), bmacnevin@nwesd.org
Jeff Ryan (Olympic ESD), jryan@oesd.wednet.edu
Megan Walker (Federal Way), mewalker@fwps.org
Angie DiLoreto (Bellevue), DiloretoA@bsd405.org
Laurie Collins (CRLNW, External Evaluator), laura.collins@crlnw.edu

Facebook (Jump on and Share! It’s a PRIVATE Facebook page!)
Name of Page: Advancing Ambitious Equitable Practice

Website
http://AmbitiousScienceTeaching.org

LOGISTICS SUPPORT

Your partners from the Educational Service Districts, School Districts and Universities will support each of the Reflective Planning and Studio Days. However, if you have any logistics-related or concerns questions, please contact:

PASTL Project Manager
Kat Laxton, PSESD Regional Science Coordinator and K-12 Science Program Manager, klaxton@psesd.org,

Lead Facilitator and Coordinator for Studio Days & Reflective Planning Days
Karin Lohwasser, University of Washington, loh2o@uw.edu
PARTICIPATING TEACHERS

Bellevue School District
International Middle School
  Luke Moorhead
  Cheryl McClure
Tyee Middle School
  Hailey Gurrad
  Janel Hershey

Bremerton School District
Bremerton High School
  Jessica McBride
  Kieth Langholff

Edmonds School District
College Place Middle School
  Amy Peterson
  Collen LaMotte

Federal Way School District
Totem Middle School
  Amy Scott
  Leslie Hargraves
  Adrienne McKay
  Gwen Roland
Sequoya Middle School
  Heather Laprade
  David Chernicoff
  Zachary McCauley
Kilo Middle School
  P.J. Williams
  Teresa Lee
Illahee Middle School
  Jamie Johnson
  Randy Kemman

Franklin Pierce School District
Morris Ford Middle School
  Josh Simondet

Highline Public Schools
  Ann Morris

Lynden School District
Lynden Middle School
  Sue Brooks
  Alexis MacNevin

North Mason School District
North Mason High School
  Anna Munkres
  Ramey Leroy
  Julie Engberg*

Chinook Middle School
  Scott Gregorich

Odle Middle School
  Stacia Bible

Interlake High School
  Faith Iverson

Central Kitsap School District
Top Ridge Jr High School
  Laura Rarig
  Kellie Ashley

The Brighton School
  Kitten Vaa

Saghalie Middle School
  Matt Tipton
  Venu Bhat

Lakota Middle School
  Brittney Clerget
  Nathan Santo

Decature Middle School
  Ted Gustin

Todd Beamer High School
  Alan Semrau

Thomas Jefferson High School
  Elizabeth Copeland
  Milana Michalec
  Matt Clouser

Canyon Park High School
  Jeff Armentrout

Bothell High School
  Chris Asmann

Glacier Peak High School
  Brian Hill
  Christina Scott

Sedro-Wooley High School
  Scott Conlan
  Laura Schmidt

Wa He Lut Indian Tribal School
  Emily Dernbach
Ambitious Science Teaching

We provide here a vision of ambitious teaching—teaching that is effective, rigorous and equitable. But more than that, we provide a framework of research-based teaching practices that are consistent with this vision and a wide range of tools that can transform how students learn in your classroom. The vision, practice, and tools will furnish a common language about teaching for a group of science educators committed to the improvement of teaching. You will be able to identify “what we will get better at” and how to get started.

Ambitious teaching aims to support students of all racial, ethnic, and social class backgrounds in deeply understanding science ideas, participating in the talk of the discipline, and solving authentic problems. This teaching comes to life through four sets of teaching practices that are used together during units of instruction. These practices are powerful for several reasons. They have consistently been shown through research to support student engagement and learning. They can each be used regularly with any kind of science topic. And finally, because there are only four sets of practices, we can develop tools that help both teachers and students participate in them, anyone familiar with the practices can provide feedback to other educators working with the same basic repertoire, teachers can create productive variations of the practices, and everyone in the science education community can share a common language about the continual improvement of teaching.

The four Ambitious and Equitable Science Teaching Practices are summarized in the below.

<table>
<thead>
<tr>
<th>Practices</th>
<th>What does it LOOK like?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planning for engagement with</td>
<td>• Planning a unit that connects a topic to a phenomena that it explains (Chemical</td>
</tr>
<tr>
<td>important science ideas</td>
<td>Reactions – Bike Rusting, Photosynthesis – Seed Becoming a Tree)</td>
</tr>
<tr>
<td></td>
<td>• Teaching a topic within a real-world context</td>
</tr>
<tr>
<td>Eliciting students’ ideas</td>
<td>• Asking students to explain HOW and WHY they think a phenomena happens (How did the bike change? Why did it change? What is happening at the unobservable level?)</td>
</tr>
<tr>
<td>Supporting on-going changes in</td>
<td>• Using ALL activities/lessons to explain the phenomena.</td>
</tr>
<tr>
<td>thinking</td>
<td>• Giving students opportunities to revise their thinking based on what they’re learning</td>
</tr>
<tr>
<td>Pressing for evidence-based</td>
<td>• Allowing students to create a final model or explanation about the phenomena</td>
</tr>
<tr>
<td>explanations</td>
<td>• Pressing students to connect evidence to their explanation</td>
</tr>
</tbody>
</table>

PASTL Summer Institute Summary 5
### How will science education change with NGSS? $

**Implications of the Vision of the Framework for K-12 Science Education and the Next Generation Science Standards**

<table>
<thead>
<tr>
<th>SCIENCE EDUCATION WILL INVOLVE LESS:</th>
<th>SCIENCE EDUCATION WILL INVOLVE MORE:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rote memorization of facts and terminology</td>
<td>Facts and terminology learned as needed while developing explanations and designing solutions supported by evidence-based arguments and reasoning.</td>
</tr>
<tr>
<td>Learning of ideas disconnected from questions about phenomena</td>
<td>Systems thinking and modeling to explain phenomena and to give a context for the ideas to be learned</td>
</tr>
<tr>
<td>Teachers providing information to the whole class</td>
<td>Students conducting investigations, solving problems, and engaging in discussions with teachers' guidance</td>
</tr>
<tr>
<td>Teachers posing questions with only one right answer</td>
<td>Students discussing open-ended questions that focus on the strength of the evidence used to generate claims</td>
</tr>
<tr>
<td>Students reading textbooks and answering questions at the end of the chapter</td>
<td>Students reading multiple sources, including science-related magazine and journal articles and web-based resources; students developing summaries of information.</td>
</tr>
<tr>
<td>Pre-planned outcome for “cookbook” laboratories or hands-on activities</td>
<td>Multiple investigations driven by students’ questions with a range of possible outcomes that collectively lead to a deep understanding of established core scientific ideas</td>
</tr>
<tr>
<td>Worksheets</td>
<td>Student writing of journals, reports, posters, and media presentations that explain and argue</td>
</tr>
<tr>
<td>Oversimplification of activities for students who are perceived to be less able to do science and engineering</td>
<td>Provision of supports so that all students can engage in sophisticated science and engineering practices</td>
</tr>
</tbody>
</table>