

NWS07-2007-000055

Abstract for an Invited Paper  
for the NWS07 Meeting of  
the American Physical Society

**Coordinating the Development of Heat and Temperature Facet Clusters with Science Education Standards<sup>1</sup>**  
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The Department of Physics and the School of Education at Seattle Pacific University, together with FACET Innovations, LLC, have just completed the second year of a five-year NSF TPC project, *Improving the Effectiveness of Teacher Diagnostic Skills and Tools*. We are working in partnership with school districts in Washington State to use formative assessment as a means to help teachers and precollege students deepen their understanding of foundational topics in physical science. We utilize a theoretical framework of knowledge-in-pieces to identify and categorize common student modes of reasoning in the topical areas of *Properties of Matter, Heat and Temperature* and *Physical and Chemical Changes*. In this talk, we describe the development of some facet clusters of student ideas in Heat and Temperature. Part of optimizing these diagnostic tools is ensuring that they are consistent with national and state science standards, research on student learning, and assessment practices used in the science portion of the Washington Assessment of Student Learning (WASL). A strong unifying theme for these standards and assessments is transfers and transformations of energy in all processes of nature, whether they occur in physical, earth/space, or living systems. This approach brings the concepts of heat, temperature, and energy into a broader context than is usually explored in traditional treatments of these ideas in physics. We discuss some challenges in developing formative assessment tools that synthesize and respect these different perspectives.

<sup>1</sup>Supported in part by NSF grant #ESI-0455796, The Boeing Corporation, and the SPU Science Initiative.