

Best Practices for the Professional Development of Teachers in Nanoscale Science and Engineering

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Best Practices for Professional Development

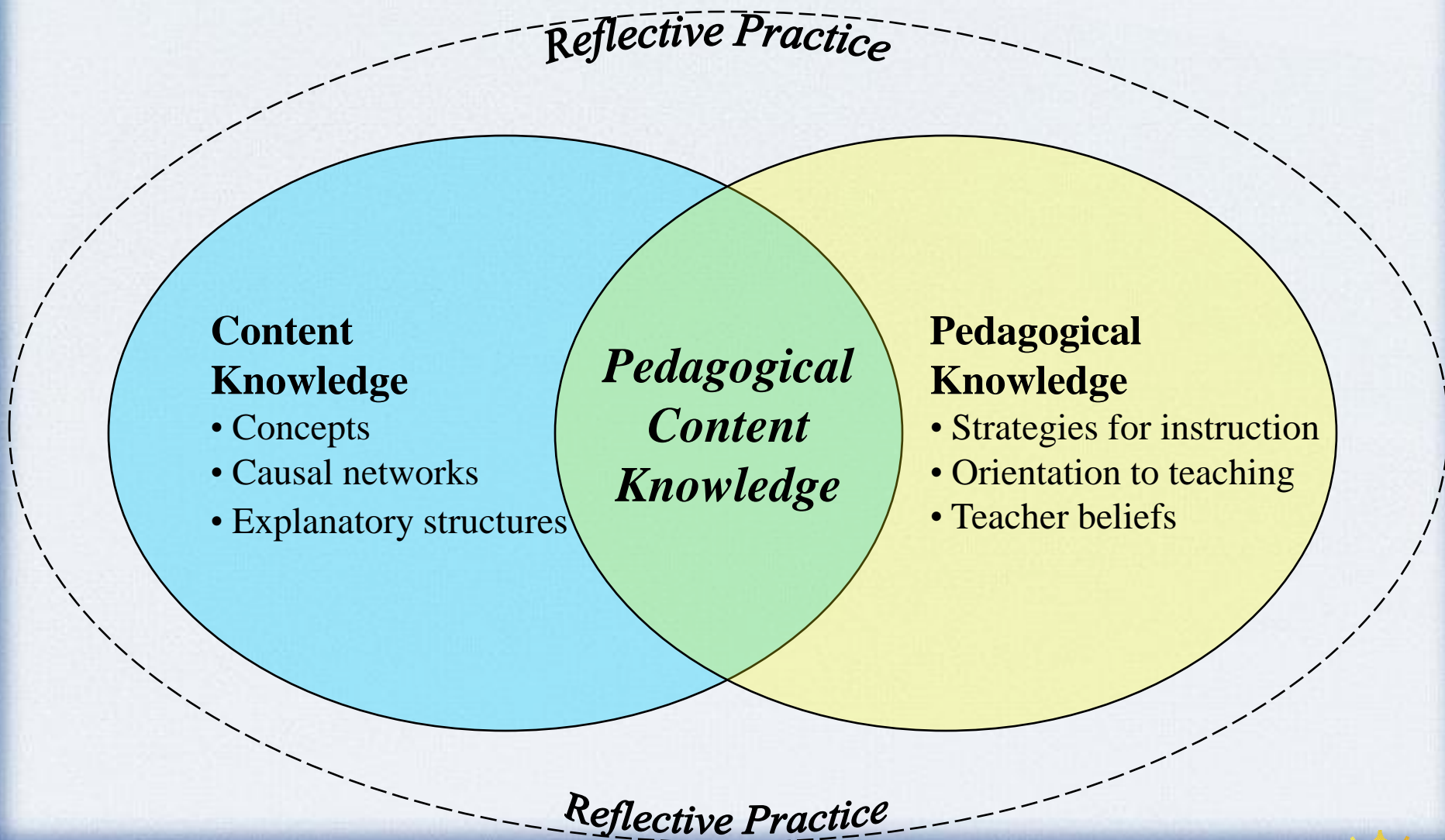
☼ Purposeful design

- What should teachers learn?
- How should a program be designed?
 - What does research say?

☼ Challenges/Opportunities for NSE PD

☼ National Center for Learning and Teaching in Nanoscale Science and Engineering

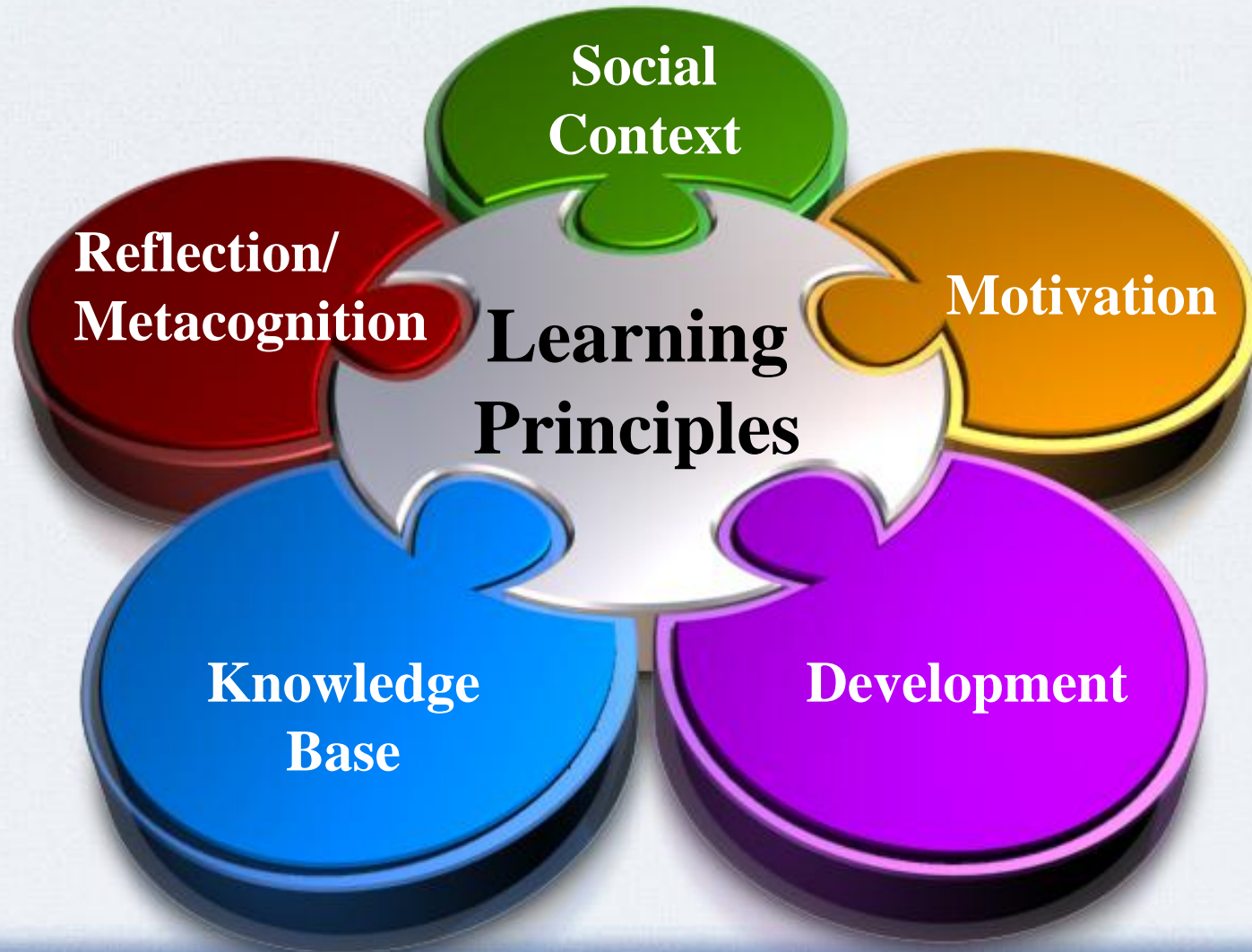
Instructional Goals: What Should Teachers Learn?



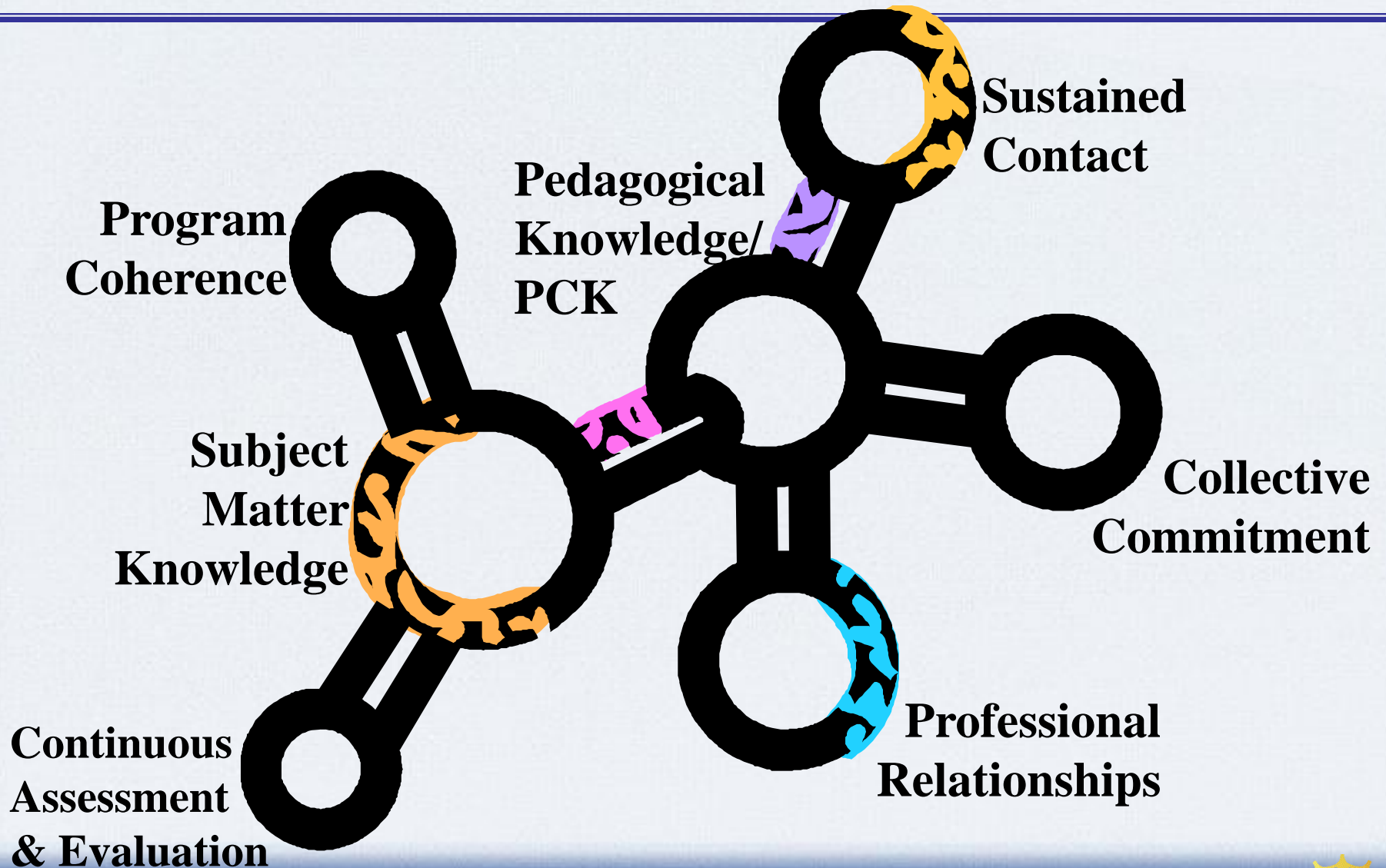
Designing Professional Development

- ✿ A “principles-based” approach (Alexander and Murphy, 1998; Hawley and Valli, 1999)
- ✿ Two bodies of contemporary and time-honored research essential to design of PD
 - Research on how people learn (*learning principles*)
 - Research on effective professional development (*design principles for PD*)

Learning Principles



PD Design Principles



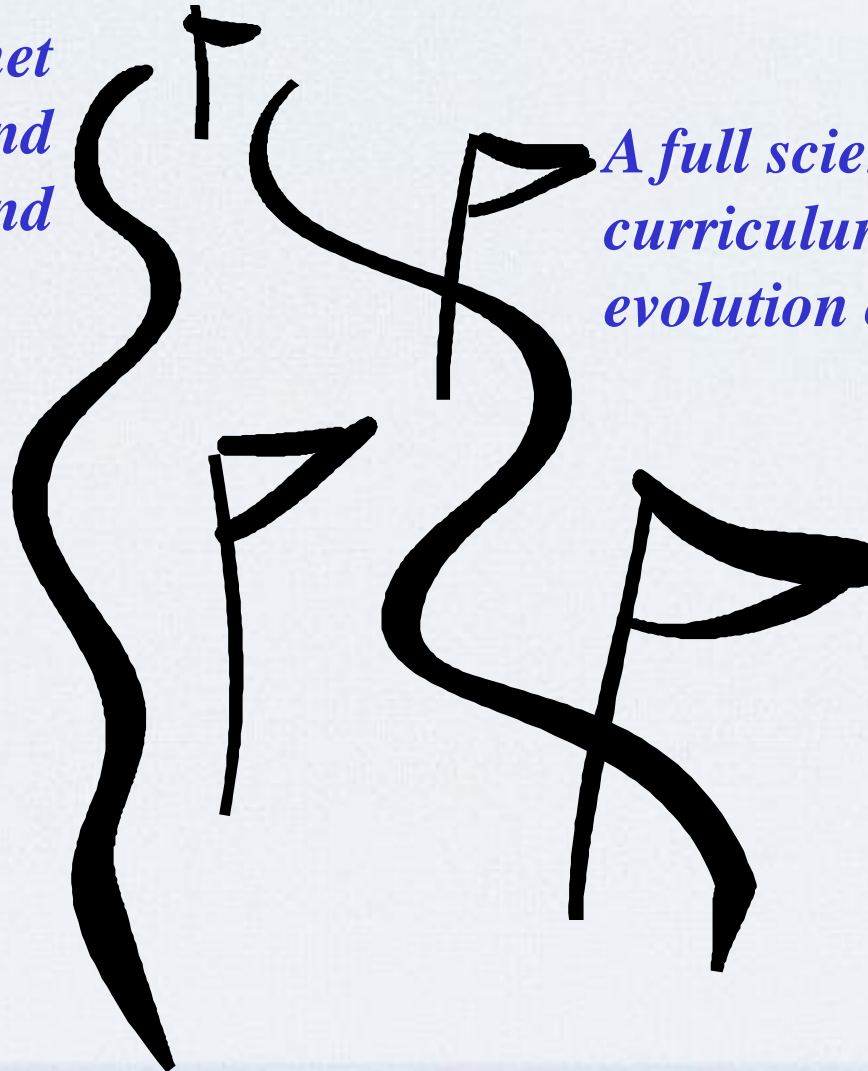
Nanoscience PD Challenges/Opportunities

*Casting the net
in an ocean and
a pond*

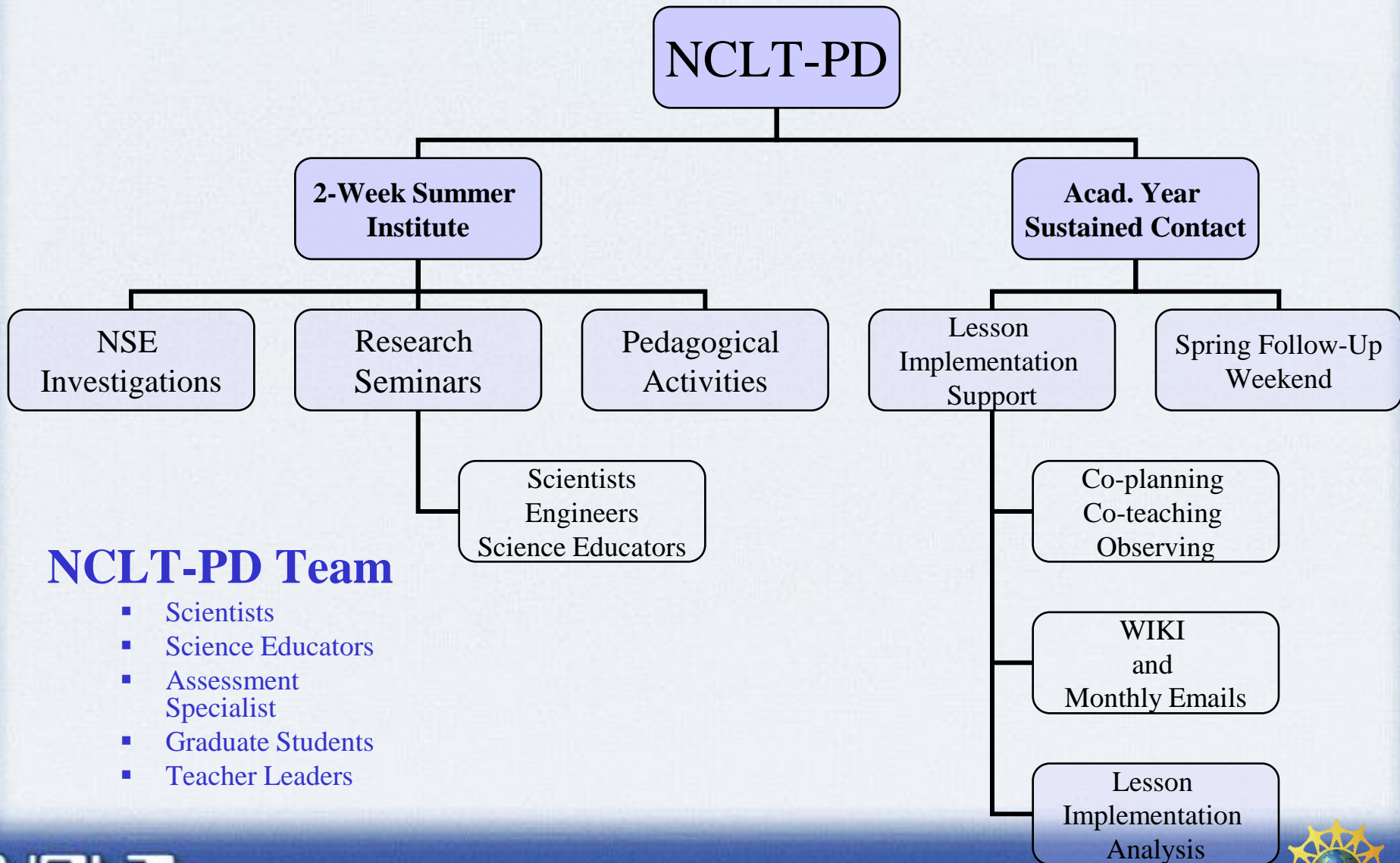
*A full science
curriculum and the
evolution of science*

*Interdisciplinary
science content and
discipline specific
courses*

*Subject
matter focus
and
pedagogy
focus*



NCLT Professional Development Program



NCLT-PD Team

- Scientists
- Science Educators
- Assessment Specialist
- Graduate Students
- Teacher Leaders

Summer Institute Content

Science Content

Big Ideas

- Size and scale
- Structure of matter
- Dominant Forces
- Size Dependent Properties
- Visualization/tools

Nanoscience Phenomena

- Buckyballs and nanotubes
- Nanomagnetism
- Quantum dots
- Biosensors
- SPM and AFM

Pedagogy

- How students learn science
- Dimensions of inquiry-based science
 - teacher and learner practices
- Alignment with state standards
- Construct-centered design lesson planning for implementation