Learning Progressions in Science: A Summary of the CCII Report

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What are Learning Progressions?

Empirically grounded and testable hypotheses about how students' understanding and ability to use knowledge and skill in core school subjects develop and become more sophisticated over time

- **In science, learning progressions are usually focused on core ideas and practices**
- **Based on research on how students' learning actually progresses, given appropriate instruction**.

Components of a Learning Progression

- **Core ideas can define the Targets of Progressions:**
  - **Understanding of core science ideas and practices at the levels thought to support postsecondary success; The end points society cares about**
- **Starting Points:**
  - **Children's initial, or early, ideas and ways of thinking that they bring with them.**
- **In between:**
  - **A hypothesized ordered progression of the levels through which understandings and skills shift and develop toward the desired target.**

Differences Between Existing Standards and Learning Progressions

Standards	Learning Progressions
Based on logical analysis of the discipline and/or on personal experience and customary practice	Based on empirical evidence of how students' understanding develops over time
Assume simple additive acquisition of knowledge by all students	Assume reorganization of conceptual structures and integration of new knowledge
Tend to separate content and practice	Tend to integrate content and practice
Do not specify instruction	Many specify the experiences and instruction that help students make progress

Validation of Learning Progressions: What is being done?

Construct validity

- **A learning progression hypothesizes a sequence of partial or intermediate levels of understanding en route to the target understanding or ability**
- **Research groups are collecting evidence to test their hypothesized progressions with longitudinal* or cross-sectional data**

Validation of Learning Progressions: What else should be done?

Consequential validity

- **Studies are needed to examine if using a learning progression to guide instruction and assessments leads to higher gains in student learning.**

Recommended Next Steps

- Validate the learning progressions
- Build curriculum and assessment tools based on the progressions (existence proofs)
- Identify the core science ideas to guide further development
- Invest in development of progressions for the central concepts for K-12 science
- Share the available learning progressions
- Encourage states revising their standards to consider the evidence on learning progressions

Panelists Who Informed Report

- Charles (Andy) Anderson, Michigan State University
- Alicia Alonzo, Michigan State University
- Karen Draney, University of California-Berkeley, BEAR
- Ravit Golan Duncan, Rutgers University
- Janice Earl, National Science Foundation
- Joseph Krajcik, University of Michigan
- Richard Lehrer, Vanderbilt University
- Charles Luey, Pearson Education
- Ron Marx, University of Arizona
- Mike Padilla, University of Georgia
- James Pellegrino, University of Illinois-Chicago
- Linda Reddy, Pearson Education
- Brian Reiser, Northwestern University
- Ann Rivet, Teachers College, Columbia University
- Jo Ellen Roseman, Project 2061, AAAS
- Leona Schauble, Vanderbilt University
- Amelia Gotwals, Michigan State University
- Mark Wilson, University of California-Berkeley, BEAR