Developing Learning Progressions to inform Formative Assessment: Five areas to develop

Brian Gong
Center for Assessment

Presentation at the CCSSO FAST SCASS Meeting
February 6, 2008 Atlanta, GA

Presentation Outline

- What's been done before
- What needs to be done:
  - My five candidate areas
- How to proceed forward?

What's Been Done

- Definition
  - Learning Progressions are developmental sequences of *content/skills*, *proficiency*, and/or *learning experiences*
- Some examples and characteristics
- Relation to formative assessment and teacher knowledge (Heritage; Hess)
- Applications: developing GLEs and AA

Five Areas to Develop

- Ways to characterize learning progressions
  - Seek for powerful connections with relevant research, conceptualization, and practice
- What develops?
  - Focus more on development of proficiency as expertise as well as content coverage and accuracy/close-in skills
- Attention to student's role, knowledge, and experiences
- Learning progressions and formative instruction/ assessment in context
  - Attend to models and real situations of instruction/learning
- Next steps for states
  - Decide on: What and Adopt/develop; focus on *how to develop*

Some Important Dimensions

- ***What***: Focus on Content, Proficiency, Developmental psychology? Anchored to GLEs?
- ***How (process and pattern)***: Assimilation/Accommodation; Accumulating/Cumulative; Linear/S-curve/ exponential/saw-tooth?
- ***When (timing and under what conditions)***: Dependent on instruction/experience/ age/cognitive development…?
- ***Who***: All students/all students with X? / otherwise conditional
- ***How much***: what is unit of development and unit of performance growth (e.g., grain-size)? What is source of evaluation standard ("good enough")? How much time?
- ***Why***: Rationale and evidence for this learning progression?

Expand on Two Important Dimensions

- Three foundational lenses for learning progressions
  - Invariant pattern (developmental psychology; structure of discipline)
  - Curriculum/Instructional design
  - Student cognitive model (what is this student's understanding)
- What progresses
  - Student masters content more
  - Content becomes more advanced
  - Student becomes more proficient (expert) on "same" content
  - Student becomes more expert on processes within and across disciplines

What develops? - Content

- Content is more accurate
- Some new content is introduced (e.g., GLE view)
- Some old content disappears
- Some content/skills are expanded in very specific ways and scope
- Some content reflects more sophisticated models
- Some content/skills are expanded to full generalization for the class of problems/actions
- Some content/skills move from "instruction and local assessment" to official "state assessment"

What develops? – Proficiency

(content, heuristic, control, belief… Schoenfeld, 1985)

- Understanding – able to operate on content
  - How it can be applied
  - When to (not) apply
  - Multiple representations
  - Self-monitoring at procedural and strategic levels
  - Independence in use and in further learning
  - How it fits into domain
  - Limitations, short-cuts, etc.
  - Automaticity
  - Creativity

Complexity continua
(from Lesh et al., 1992)

- Rote recall to strategic thinking (Webb)
- Memorize, perform routine procedures, communicate understanding, perform nonroutine problems, conjecture/generalize/prove (Porter & Smithson)
- Concrete to abstract (Dienes)
- Global to analytic to deductive (van Hiele)
- Pre-operational to operational (Piaget & Beth)
- Concepts to rules to problem-solving (Gagne)
- Enactive to symbolic (Bruner)
- External to internal (Vygotsky)
- Situated to decontextualized (Cole & Griffen; Greeno)
- Facts/skills to applications to analysis/synthesis/evaluation (Bloom)
- Naïve interpretations (based on superficial characteristics) to scientific models (focused on key attributes and underlying regularities) (Steen)
- Application, learning potential, metacognition, beliefs and values, whole (Ginsburg et al.)

Thinking in the Content Disciplines
(Donald, 2005)

- Orderly Thinking: Learning in a Structured Discipline
- Hard Thinking: Applying Structured Knowledge to Unstructured Problems
- Inductive Thinking: Knowledge-Intensive Learning
- Multifaceted Thinking: Learning in a Social Science
- Precedent and Reason: Case Versus Logic
- Criticism and Creativity: Thinking in the Humanities

Five Areas to Develop

- Ways to characterize learning progressions
  - Seek for powerful connections with relevant research, conceptualization, and practice
- What develops?
  - Focus more on development of proficiency as expertise as well as content coverage and accuracy/close-in skills
- Attention to student's role, knowledge, and experiences
- Learning progressions and formative instruction/ assessment in context
  - Attend to models of instruction/learning
- Next steps for states
  - Decide on: What and Adopt/develop

What about the learner?

- When does the student become a contributor?
- What about what student can do to promote own development and learning?
  - Beyond "engaging as directed by teacher"
    - Beyond simple "Gap analysis and Corrective Action"?
  - Beyond "motivation"
  - Intentional learning frameworks applied by students

Instructional Context

- Go beyond definition and examples
- Go beyond declarative descriptions and characterizations
- Go to procedural examples and implementation
  - How to do it
  - Acting in the social contexts
  - How one changes over time
  - Creating social agreement, coordination, and coherence

Some stimulating examples for learning progressions…

- **Developmental Content Progression –** "Fractions and Rational Numbers." From Lamon, Susan (and activities to promote teacher understanding of content)
- **Learning About Expertise –** "An Analysis of Electronics Troubleshooting Expertise." From Lesgold, Alan & Lajoie, Susanne.
- **Learning Progression: A Curriculum View –** "Our Approach to Science Curriculum." From SEPUP, published by the Lawrence Hall of Science.
- **Learning Progression: A Lesson View (and teacher process) –** "Mathematics Learning Lesson Plan." From Fernandez Clea & Yoshida, Makoto.
- **Creating Learning Progressions: An Instructional Science Example –** "Part-Task Sequencing of Learning Tasks." From van Merrienboer, J. J. G. & Kirschner, P. A.
- **Supporting Standards-based Education with Learning Progressions and Associated Materials –** "Victorian Essential Learning Standards Sitemap." Published by the Victorian Curriculum and Assessment Authority.

See handouts for references and annotations

Developing Learning Progressions

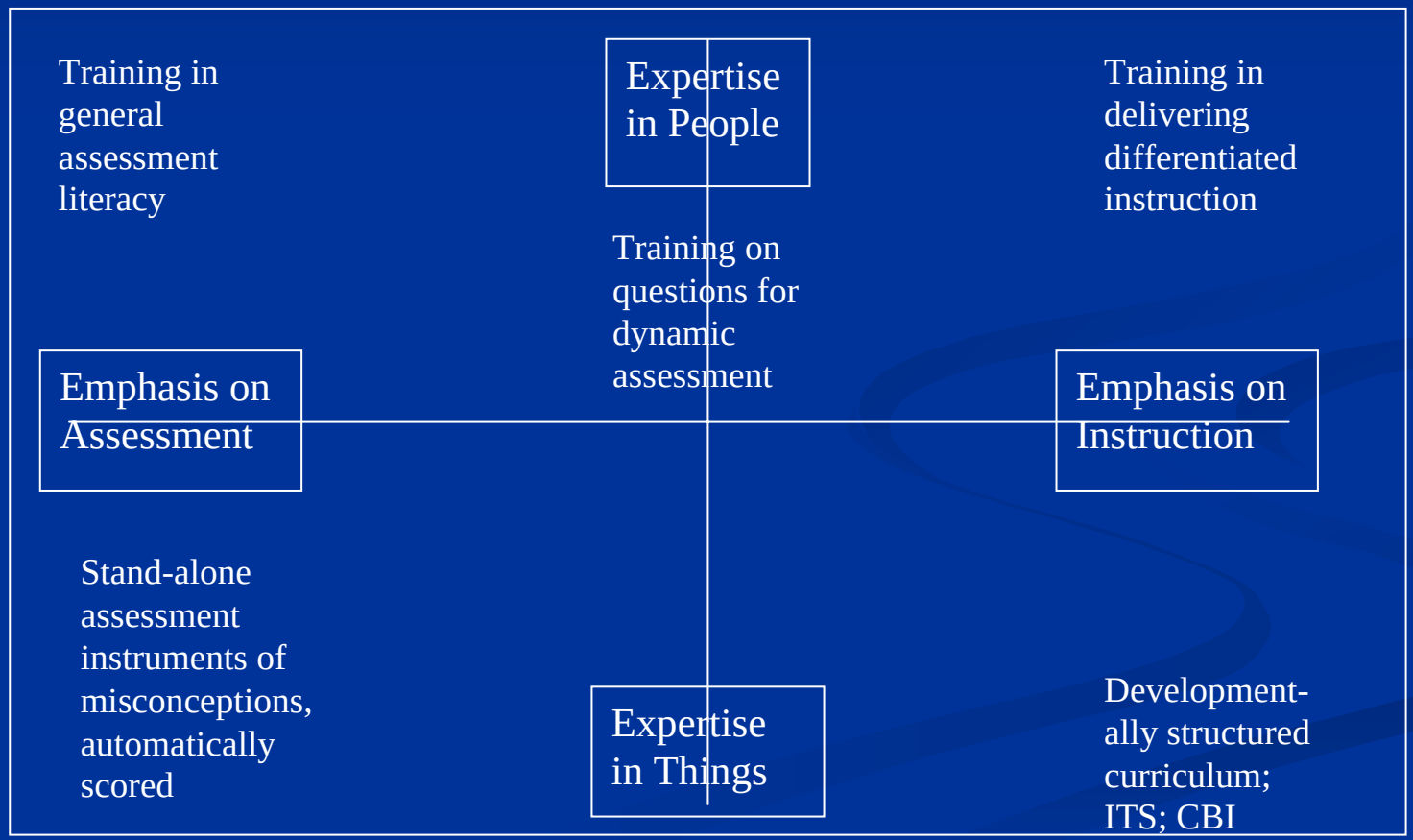
- What do we learn from the examples?
- What other examples should we seek out and learn from? - what research, conceptualizations, and practices can inform us?

- If there are not enough "learning progressions" already easily available to address our needs, how should we develop them?

Next Steps for States

Decide *what* to focus on to improve formative assessment

Where should I put my resources? Two dimensions:



Next Steps for States

- Decide *what* to focus on
- Decide *how* to get it: adopt or develop (at some level)
- Create and execute *implementation plan*
  - Who will do what, when, with what resources, how, and how monitored for improvement
    - ***Role of the state*** versus what districts, schools, teachers/administrators, partners, outside market should do
  - And attend to credibility, resource flow, adult learning, etc.

For more information:

Center for Assessment

www.nciea.org

Brian Gong

bgong@nciea.org