Developing and Using Learning Progressions as a Schema for Measuring Progress

Karin Hess, National Center for Assessment, 2008

Do all students have access to instruction of grade-level content? What does a measure of academic progress within *and* across grade levels actually look like? Do state content standards provide enough of a map to plan meaningful instruction *within* each school year? What guides instructional decisions when students fall behind, or when instruction focuses on skills and concepts considered to be "below" current grade level content? To answer these complex and multi-layered questions, we must examine several important dimensions of standards-based curriculum, instruction, and assessment as we consider applying a learning continuum schema to measure progress for all students.

What exactly are learning progressions? – A Horse Story

First let me start with a story to illustrate a non-school learning progression. When I purchased a 6-year-old, high-strung, Arabian mare, I had no idea what her past "education" and life experiences had been, but knew as soon as I began to work with her that she was not the perfect horse I had imagined her to be. Leichda (a name that roughly translated means "lighten up" in ancient Bohemian) immediately let me know by her body language that she was head-shy. For those who are not familiar with the term, it means that she would jerk her head away from anything that came near her face, probably because she had been hit in the face as a young horse as punishment for misbehaving. This meant, in practical terms, that I could not easily touch her face or neck, brush or trim her mane, or put on a halter or a bridle. Since controlling a horse's head is the key to controlling a horse, I had my work cut out for me. I am not a horse trainer; so I set out to research available methods to address this problem.

An excellent video by a well-known horse trainer explained that this problem would require something like moving from the first floor to the top floor of a building. Leaping from the ground to the top floor without a ladder or stairway was out of the question – this would be accomplished using many small steps in between, all of which might not look like the final goal of easily putting on a bridle. A variety of items were suggested as a starting point for this progression of learning in order to desensitize her face and head (e.g., different-textured materials and objects, large pieces of plastic and crinkly paper, leather items, etc.) I was to consider these as possible ladder steps (fewer for a steeper rise) or stairs (more steps for a gentler rise) and place them in order as to which progression might move Leichda forward towards the learning goal. In other words, I had to consider how each interim learning activity would be used to map the overall learning pathway, and then provide ample time and opportunity to get there.

Ultimately, it took many months to consistently touch increasingly "scary" items to her face and head without a fearful or aggressive reaction. Each step along the way required that I use formative assessment data to determine what should come next – a new approach? different material? shorter duration, etc.? While I was following a typical learning progression for all head-shy horses, I could not assume that all horses learn exactly at the same rate or in identical ways. It was also important that I not loose sight of the ultimate learning goal or I might end up with a horse that could never be ridden (no bridle), but would happily wear all kinds of hats on her head! As an educator, it was hard not to make comparisons to what I'd done for many years in my classroom – planning, teaching, and then adjusting the teaching when needed.

Part I: Defining Learning Progressions

Many researchers (including developmental, educational, and cognitive psychologists), as well as curriculum and content specialists, have attempted to define and operationalize the use of learning progressions/continua for instruction and assessment purposes over the years. For example, Wilson & Bertenthal (2005) define them in terms of "descriptions of the successively more sophisticated ways of thinking about an idea that follow one another as students learn;" while Masters & Forster (1996) see them as "a picture of the path students typically follow as they learn...a description of skills, understandings, and knowledge in the sequence in which they typically develop."

- *These definitions also describe in general terms what I did with my horse's training. I began with an expert horse trainer's description of the "typical learning pathway" for overcoming being head-shy and was then able to develop, implement, and sometimes modify my training plan to get to the learning goal.*

Duschl, Schweingruber, and Shouse (2007) describe learning progressions as "anchored on one end by what is known about the concepts and reasoning of students entering school… [for which] there now is a very extensive research base." At the other end of the learning continuum are "societal expectations (values)" about what society wants students to know and be able to do in the given content area. Learning progressions propose the *intermediate* understandings between these anchor points that are "reasonably coherent networks of ideas and practices…that contribute to building a more mature understanding." Further, they explain that often, the "important precursor ideas may not look like the later ideas, yet crucially contribute to their construction."

- *This, too, was true in my horse story – the materials and strategies that I selected included some things that did not look like or function exactly like halters and bridles, but served as important precursors to what would be much more restrictive later on. It was the purposeful selection and use of these materials that gave me formative feedback to guide my next steps in instruction.*

Another way to think about learning progressions is taken from the work of The National Alternate Assessment Center/NAAC (Flowers, Browder, Wakeman, & Karvonen, 2007) in which progress is described as students moving from generalizing their responses across people or settings to generalizing their understanding of concepts. The latter is a more sophisticated way of demonstrating understanding than simply generalizing across people or settings, in that "students eventually demonstrate responses across more than one task format, such as understanding the concept of the number 10 as applied in time telling, bus numbers, math problem solving, etc."

- *With my horse, I had to consider the broader concept of how to desensitize her head and face with a variety of objects and materials, before she would readily accept and generalize that nothing coming towards her face or put on her head would hurt her. While this was not the initial and specific learning goal for her, it was clear to me that focusing on the essential underlying concept would take her much farther than the short-term objective.*

In the U.S., states have understandably paid much more attention to developing state content standards and grade level expectations across grades, than to considering the ways that learning actually progresses *within a grade level* or researching how learning "connects and builds" from one year to the next. There are currently, however, many

state- and district-level initiatives seeking to provide guidance to teachers and schools about how to use formative classroom assessment to plan instruction and measure progress; how to "break down" content standards and benchmarks within grade levels in order to meet the diverse needs of learners – especially the lowest performing students in each classroom; and how to extend or expand content standards in order to provide meaningful "academic" instruction for students participating in alternate assessments. This paper will describe how many instructional and assessment challenges can be informed by the use of thoughtfully constructed learning progressions.

Four *Interrelated Guiding Principles* of Learning Progressions (LPs)

Drawing from the various definitions and descriptions of learning progressions, some unifying ideas begin to emerge that can shape our thinking about what makes a well-constructed learning progression or how one might go about developing, refining, and using learning progressions for different purposes. Existing research describing developmental stages of learning and related instruction to support that learning (e.g., literacy and mathematics developmental continua developed through Edith Cowan University in Western Australia; phases of spelling development, Gentry & Gillet, 1993) and research initiatives supported by content-specific organizations (e.g., National Science Foundation, American Association for the Advancement of Science, National Research Council, International Reading Association) offer examples of learning progressions that embody four interrelated guiding principles.

Four *Interrelated Guiding Principles* of Learning Progressions (LPs)

- **LPs are developed (and refined) using available research**
- **LPs have clear binding threads that articulate the essential/core concepts and processes**
- **LPs articulate movement toward increased understanding**
- **LPs go hand-in-hand with well-designed/aligned assessments**

A brief explanation of each guiding principle is provided below. (See bibliography of resources for some content-specific learning progression examples.)

Guiding Principle I

LPs are developed (and refined) using available research: Evidence of use of available research is essential in articulating learning progressions. Otherwise, it is simply a "best guess" about how curriculum, rather than how learning should develop. Three possible sources of research data can inform both development of LPs or refinements to existing LPs.

- **Cognitive research** provides descriptions of how learning generally occurs, such as Vygotsky's ZPD/Zone of Proximal Development (1978).
- **Content-specific research** has uncovered indicators of how conceptual understanding typically develops for the content domain, such as Driver's synthesis of science learning and common misconceptions (2002).

- **Action research** at the classroom, school, or district levels offers possibilities for using formative assessment data to refine or "fill in gaps" in the existing or "curricular" LPs. Collaboratively analyzing data from ongoing classroom assessments provides a unique opportunity for teachers to develop a deeper understanding of how learning actually progresses. Teachers can "zoom in" for a closer look using formative assessment data with a much finer grain size and then "zoom out" again when using the larger-grained interim and summative assessments that monitor progress over longer learning periods (Gong, 2008).

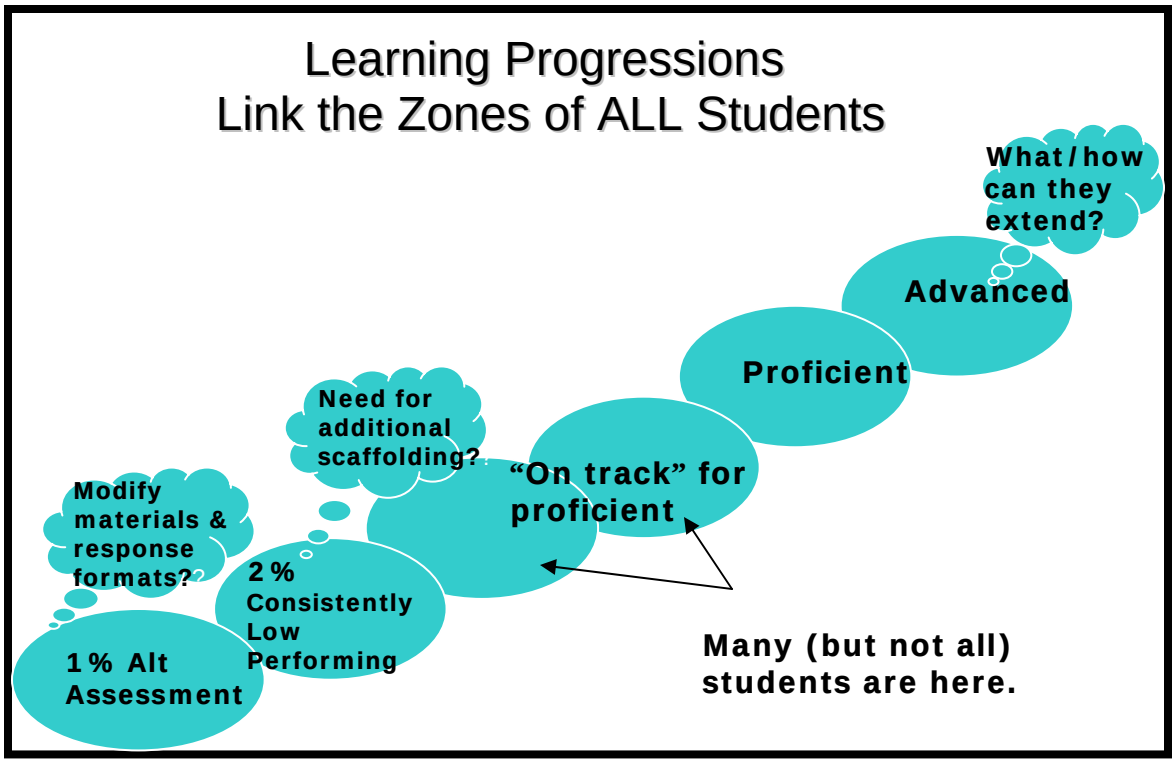

Figure 1: Learning progressions connect the "learning zones" of a range of learners within a classroom or grade level. Different instructional materials and strategies will be used by teachers at different points along the learning pathway, but progress is seen as a continuum of learning. (The Zone of Proximal Development/ZPD is the range of potential each person has for learning. Vygotsky (1978) maintained the child follows the adult's example and gradually develops the ability to do certain tasks without help or assistance. He called the difference between what a child can do with help and what he or she can do without guidance the "zone of proximal development.")

Guiding Principle II

LPs have clear binding threads that articulate the essential/core concepts and processes: The big ideas, meaning the "essence" of important concepts and essential processes, are the binding threads that connect learning across grades and/or over instructional time. Measuring progress is only possible when these binding threads are clearly evident in the LP and connect learning that gets at core ideas and enduring understandings (Wiggins & McTighe, 1998; Duschl, Schweingruber, & Shouse, 2007).

For each content area, these essential threads interact to build greater understanding. Identifying a small number of essential threads makes the LP manageable in terms of tracking ongoing progress in the classroom. For example, in reading, four core "unifying threads" might be: (1) making meaning at the word level; (2) making meaning at the text level; (3) applying reading strategies; and (4) developing breadth and depth of vocabulary. Each thread articulates increased understanding of the core idea. *Collectively, these threads weave the tapestry of what is means to be a reader, while each thread develops both in isolation and in relation to the other threads*. And as with cloth, the whole of it will be stronger than any single strand of thread.

The table below shows an example of "a collection of reading concepts and skills" (on the left) and reading concepts and skills with a related "unifying thread," vocabulary development.

<table>
<tr><th>A "Collection" of Reading Concepts and Skills</th><th colspan="2">One "Thread" in the Reading Tapestry:
A Learning Progression for Developing Breadth and Depth of Vocabulary</th></tr>
<tr><td rowspan="2">■ Identify words that are nouns
match object to picture
match picture to word
■ Identify words that are verbs
match object to picture
match picture to word
■ Identify words that have same or different meanings
■ Track text from left to right
■ Track text from top to bottom
■ Read high frequency words</td><td>Early/Foundational Skills for Developing Vocabulary

❖ Identify vocabulary (pictures, symbols, objects, or words) that demonstrate knowledge of basic pragmatic functions (e.g., social words, asks questions, makes requests)
❖ Generalize use of pictures, symbols, objects, and actions to identify their meaning
❖ Use vocabulary to identify objects and events, (e.g. applies vocabulary in variety of settings).</td><td>Developing & Expanding Skills for Developing Vocabulary

❖ Expand vocabulary with words related to known words (e.g., words that sound the same, are spelled the same, are in the same category, etc.)
❖ Use word structure/ known parts of words to make sense of the whole word:
• Word parts (syllables, base words, word roots, affixes)
• Meanings of word parts
• Compound words, compound word families – e.g., everyone, everywhere, everything]</td></tr>
<tr><td>The above list of skills provides no obvious conceptual unifying thread, even though everything is related to reading in some way. The order is not useful for measuring progress or planning next steps for instruction.</td><td colspan="2">⇒
A sample continuum of skills with a unifying thread - vocabulary development</td></tr>
</table>

Guiding Principle III

LPs articulate movement toward increased understanding: There seems to be general agreement that LPs are not linear or lock-step sequential routes to a learning goal; they articulate movement toward increased understanding in the way that a map provides both the network of interrelated routes with surrounding terrain and potential pit stops that might affect the journey. This movement toward increased understanding can be described in several possible ways:

- Greater depth of understanding;
- Increased breadth of application/ability to generalize and transfer learning; and/or

- Movement from "novice" or naive understanding of the content/concepts to more sophisticated "expert" thinking and reasoning.

Guiding Principle IV

LPs go hand-in-hand with well-designed/aligned (formative and summative) assessments: Learning progressions of the appropriate grain size, used in conjunction with assessment data, can provide schemas for:

- Planning and modifying instruction;
- Developing assessments and interpreting assessment data – especially formative assessments; and
- Monitoring individual or group progress.

Learning Progressions offer guidance about how learning generally will develop, and consequently, how to create or use ongoing assessment "probes" (e.g., Keeley, Eberle, & Farrin, 2005; Rose, Minton, Arline, 2007; OGAP, 2007) that reveal where particular students might be at any point in time along the learning continuum. Formative assessments can take many different forms and formats; however, those that "uncover" student thinking provide the greatest benefits when used with LP development/refinement, planning instruction, or monitoring progress over time.

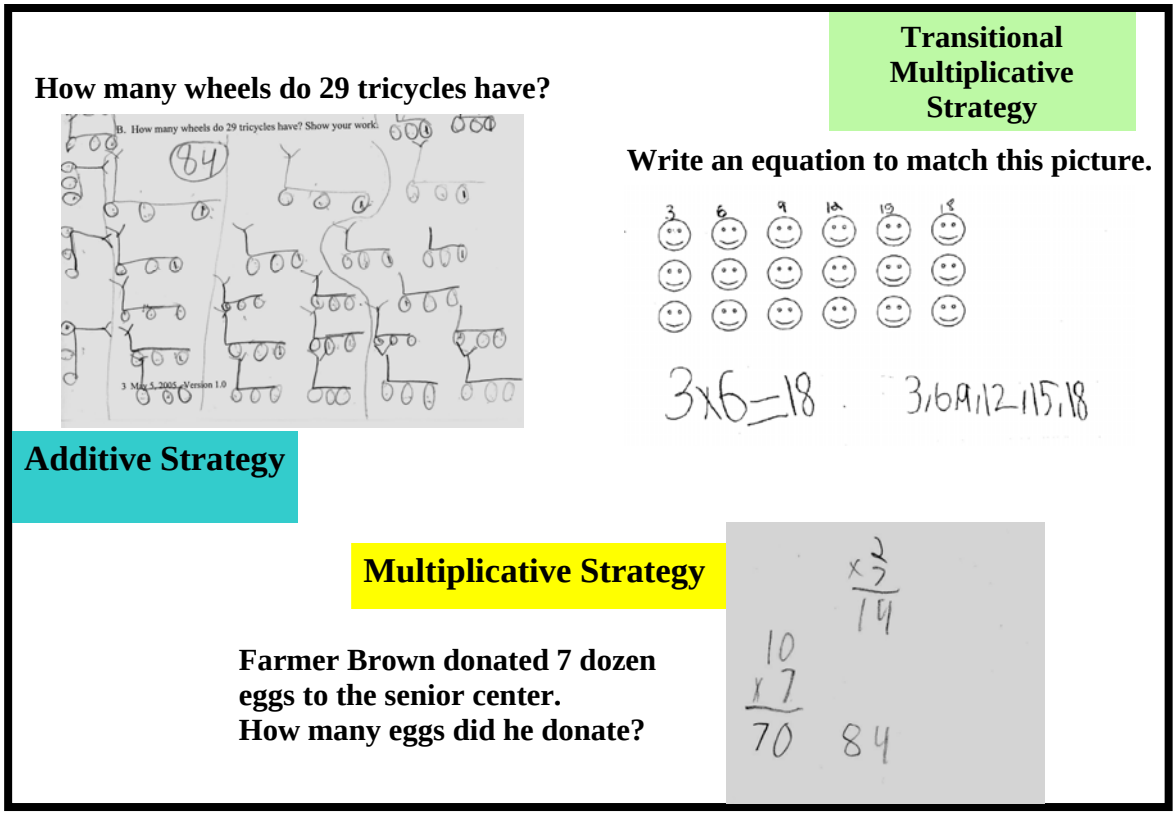

Figure 2: Formative assessments can uncover thinking to show how student understanding is developing along the continuum of learning/learning progression (Source OGAP: The Vermont Mathematics Partnership is funded by a grant provided by the US Department of Education - Award Number S366A020002 - and the National Science Foundation - Award Number EHR-0227057 - January 18, 2008)

A combination of well-designed and aligned formative assessments would include: teacher observations (both ongoing and systematic observation); evidence in student work (what's there/what's missing in student responses); conferencing/interviewing students (e.g., during a cognitive lab or think aloud); and assessment tasks that require students to reveal or construct thinking and reasoning.

LPs also provide opportunities for monitoring the use of interim and summative assessments across grades. Both mastery of specific concepts and skills and "Novice-to-Expert" understanding of concepts can be incorporated into the learning continua within and across grade levels.

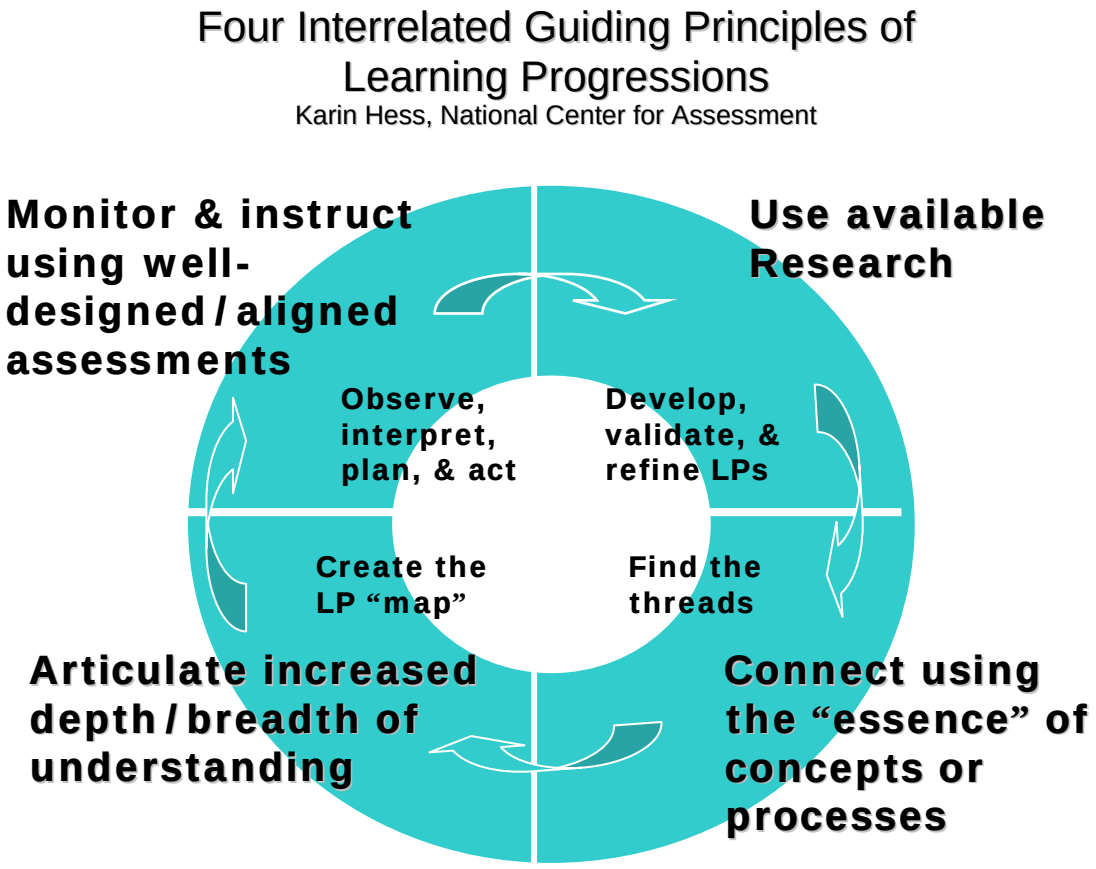

Figure 3: Four *Interrelated Guiding Principles* of Learning Progressions - An analysis of well-constructed learning progressions shows how four interrelated guiding principles can inform an iterative process to develop, refine, and use learning progressions for instruction and assessment purposes.

Part II: Tools & Strategies for Developing and Using Learning Progressions

Applying the Four Interrelated Guiding Principles to Develop/Refine/Validate Learning Progressions

A few simple questions related to the four guiding principles can be used to examine existing curricular, developmental, or even "draft" (in my head) learning progressions. Since the guiding principles are interrelated, there is not a linear sequence for using them to validate or refine the LP. One group of teachers might be starting with formative assessments and data collection in order to create a LP that will guide instruction; another group might be considering whether to "adopt" an existing LP and want to first examine its validity by checking the research base and identifying the unifying threads before determining which aligned assessments they will use to measure progress along that continuum.

Questions for Developing, Refining, or Validating Learning Progressions

1. Is this learning progression research based?
    - What does the/our research say about learning this concept/skill ____?
    - What additional research might be needed?
    - How can we collect more data using our own action research?
2. What is the "essence" of learning in this progression?
    - What are the core ideas/the essence of concepts and processes for this content area?
    - Does the thread connect throughout the LP? And across grade levels?
    - Are different conceptual ideas – threads – getting tangled in ways that prohibit really measuring progress made?
    - What is a manageable number of core threads for each content area? (Is this essential learning/an enduring understanding or simply a list of facts to memorize?)
3. Does the learning progression describe a meaningful *range* of skills/concepts? How does understanding "grow" over time with instruction/learning experiences?
    - Depth? Breadth? Complexity? Generalize/Transfer?
    - Novice – to – Expert?
    - Is there enough clarity to design/align assessments?
4. What do our assessment data (e.g., observations, student work samples) tell us?
    - Are there gaps in the LP? (Do we need to better describe earlier learning/thinking, something between levels we have, later levels, important "side trips" on the map, etc.?)
    - Are we getting enough/the right information from our assessments to: track progress over time; see patterns; see where students are along the learning progression?
    - Do we need to modify/expand our use of assessment tools? (Are there tools or approaches that will better capture what students are thinking? Are there tools

we can use more than once during the instructional cycle to measure deeper understanding over time?)

Some Concrete Suggestions for Developing or Refining Learning Progressions

Wording refinements to LPs

- Is language clear enough for designing formative assessments that elicit differences (meaning a range of possibilities) of responses related to the same unifying thread?
- Is language clear enough for distinguishing "stages/phases" along the learning continuum?

Consider grain size of descriptors

- Grain size of descriptors should match the purpose of the LP. For example, a larger grain size descriptor could be used across grades; descriptors used within a grade level would be of a finer grain, breaking down concepts or processes for within-grade monitoring. A very small grain size would be unmanageable with a class of 20+, but more appropriate to measure progress when learning is more individualized and expected to take a longer time. For example, alternate (1%) assessments focus instruction on a few skills or concepts during the school year. These might be broken into smaller-sized descriptors to measure progress throughout the school year. Instead of simply stating a learning goal of "observes" it might be more meaningful to list a continuum of observation skills:
  - *Distinguishes differences in physical characteristics*
  - *Identifies similarities in physical characteristics*
  - *Identifies both differences and similarities in physical characteristics*
  - *Categorizes objects and materials by physical characteristics*
  - *Explains why things belong to a specific group*
  - *Distinguishes relevant differences from non-relevant differences when trying to answer a specific question*
- Some grade level benchmarks (e.g., grade level expectations) are too small in grain size to be expanded as LPs and should be consolidated with other benchmarks around big ideas/the essence.

Conceptual refinements of LPs

- Identify the MAJOR concepts – the "big ideas" of each discipline. Remember that topics are not concepts. Lists of facts are not concepts. *Focus on the conceptual understanding that underlies the topics taught and why you teach them.*
- Consider whether descriptions of conceptual levels along the continuum are too arbitrary. Have you simply made a best guess about what learning might be "halfway" between two grade level benchmarks? (E.g., do most students learn half of what they need to know about visual and numeric patterns simultaneously or do they need to master concepts using visual patterns before they transfer or generalize those ideas to understanding numeric patterns? Formative assessment data will help to answer these questions.)

- Check the continuity of the "essences" or unifying threads, especially when extending descriptors down for use with the students taking the alternate assessment. (See examples of "zooming in" in Part III of this paper.)

Some Tools & Strategies

- Sample Student Profile [online] available: www.nciea.org – Science Inquiry PreK-4: for manageable and consistent data collection and interpretation
- "Analysis to Action" Tools [online] available: www.nciea.org – Analysis to Action: 4 applications – to develop, refine, or validate LPs and interpret student progress

(At least) Six Possible Ways to Get Started with Learning Progressions

It is not recommended that you start from scratch and work for years researching learning progressions in all content areas; nor should you wait for "smart people" to develop them for you. There are ample existing resources to support getting started, and while this work cannot be done quickly, it can and should be done collaboratively and thoughtfully in order to inform teaching and learning throughout the process. (See Bibliography for formative assessment and learning progressions resources.)

No matter what approach you decide to use, the four interrelated principles still apply:

- Use available research, even it means your own ongoing action research with formative assessment
- Identify clear binding threads that articulate the essential/core concepts and processes of the content area – work with a grain size that matches your purpose
- Articulate learning that moves toward increased understanding (deeper, broader, more complex, etc.)
- Consider how well-designed/aligned assessments will advance your work

Here are some possible ways to approach development and use of learning progressions.

1. Grade level/content teams analyze existing units of study within a content area to identify (and clarify) the *implied* LPs

This approach begins with what already exists – those standards-based units of study that teachers created and are already very familiar with. It is especially important to have role-alike groups (e.g., middle school science teachers, reading teachers K-2) involved with this activity, so they can share common experiences (and time to meet), review student work samples together, and are invested in knowing the content well enough to examine student learning more closely (although perhaps to a lesser or greater degree). Comparing units of study taught during the course of a school year will uncover whether or not they actually build understanding over time (as with conducting research in social studies) or are stand-alone events that rarely repeat the same skills and concepts.

2. Select any (research-based) LP model in one content area and "test" its validity by collecting instructional and formative assessment data to analyze

Analyzing some of the existing content-specific learning progressions and learning continua can be the starting point for determining potential classroom use. (See Bibliography for some research-based examples.) Organize the review by content-specific groups (e.g., K-12 mathematics committee or mathematics teachers K-4) who meet to analyze already-existing learning progressions. Use the questions on page 7 of this article to get things started. If a particular LP is selected as being research-based with clear unifying threads, then the teachers can begin to plan instruction and use ongoing formative assessment to validate or refine the LP; or they can then revisit those units of study and perhaps refine them to be more supportive of the learning progression during the year.

3. Use existing learning progressions to draft your own and then plan, teach, and use ongoing assessment to validate and/or refine them. Currently, literacy (reading, writing, and oral communication) and numeracy learning probably have the greatest number of research-based materials to tap in to; however, there are also very good resources that address science inquiry and the development of most major science concepts. "Unpacking content standards" (Wiggins & McTighe, 2001) to identify the essences – the enduring understandings - is a good starting point for this approach. Once the big ideas have been identified review existing learning progressions resources that align most closely with your state's grade-level content standards to create a draft of descriptors of appropriate grain size. The Hawaii Learning Progressions project, described on pages 14-15, used this general strategy. Once drafted, teachers collected formative assessment data for analysis

4. Content teams conduct cognitive labs (asking students to think aloud) with existing common assessments to better understand how learning evolves
Teachers, who are interested in collecting more meaningful assessment data or wanting to revise existing assessments, can administer their formative assessment probes or interim assessments, making one important change in what they usually do. During the administration, they observe how students are engaging in the assessment tasks and select a few students to "interview" afterward. These interviews help teachers to better interpret why students think the way they do while responding (Johnstone, Liu, Altman, & Thurlow, 2007). Sample interview questions might include: How did you decide that was not the correct response? What was your strategy for checking that answer? Can you tell me why this one was so easy or difficult? For the best results, interviews should be conducted with a range of students (falling all along the learning continuum in their understanding). I've worked with researchers and school district curriculum teams in both MN and VT who have successfully used a cognitive lab approach to develop and refine interim and summative assessment test items in reading, and for cross-grade learning continuums in mathematics and science.

5. Use a Problem-Based School Development/PBSD approach: A small team of committed teachers develop and pilot a LP over several months and report findings and recommendations to staff
Problem-Based School Development/PBSD (Clarke, Sanborn, Aiken, Cornell, Goodman, & Hess, 1998) is an approach to school improvement used by many school districts that

involves teams of individuals coming together to address a real-world problem they are currently dealing with separately. “They organize their work around questions they generate about a current problem situation and search for new information –from the library, living sources, communication networks, and local field tests/action research – to gain a sense of what might work as part of a solution.” Participants organize the “local inquiry project” in their own school and report findings to other teams, staff, and administrators at the end of the inquiry period.

6. University support through pre- and in-service courses and opportunities for guiding action research

Locating and sifting through appropriate cognitive and content-specific research is much too time consuming for most teachers to attempt. Universities can support any of the above approaches as part of pre-service coursework for teachers or graduate level and continuing education courses. The research perspective can be carefully guided by university staff, such as with the Problem-Based School Development/PBSD model which was developed at the University of Vermont in cooperation with many school districts across the state.

Part III: Matching the Learning Progression Purpose to Grain Size: Three Examples of How Learning Progressions are Being Applied

"Zooming in" to the Finest Grain Size: Extending grade-level content standards down for measuring progress in alternate assessments

Alternate assessments are often based on "extending grade-level standards down" to provide greater access (or entry points) to students taking the alternate (1%) assessment. Understandably, this sometimes means diminishing the cognitive complexity of grade-level expectations and/or narrowing the breadth of content to be learned. Too often, however, it can result in a collection of disjointed skills and concepts organized under the general heading of "reading" or "mathematics." While a student might be able to demonstrate accuracy or independence on one task, that success may not actually relate to other expectations in the same content area.

Several major challenges face states when developing extended standards and/or alternate assessments that are clearly linked to grade-level standards:

- How best to focus on the important core learning –how do we identify the essence of learning in each content area?
- How to plan instruction so that learning builds upon prior learning when there is no clear vision about a learning continuum within and across years – what comes next?
- How to set reasonable expectations for increasing the complexity of instructional and assessment tasks and student responses – what does complexity really mean?
- How to really measure learning progress when learning targets are few in number, narrow in scope, and often not connected to earlier learning?

The focus of instruction for students with significant disabilities could unintentionally limit potential learning by: (1) failing to identify the *essential learning* of each content area (the essence or enduring understandings); and (2) failing to envision how understanding could deepen or broaden over time. Learning progressions with smaller grain sizes can provide small stepping stones that link early/foundational skills to academic content that runs across the grades.

Examples of Essential Learning	**Foundational Skills**	**That lead to …**	**Later learning**
Reading at the Text Level	Concepts of print: print carries a message, tracks print (top-bottom, left-right), parts of books Use of pictures, symbols	Connects text to personal experience Identifies general topic of text Responds to questions	States main/central idea Uses text structures (e.g., sequence) to organize ideas Retells or summarizes Identifies author's message
Using information/ data to communicate and support ideas	Counts/1:1 matching Distinguishes numbers from letters Discerns differences	Labels sets of objects with words, numbers, or symbols Makes observations Sorts, categorizes by physical attributes	Collects data Uses data to answer a question Displays data Explains data, observations

In the above examples, the phrase "leads to: …" is used to show possible later learning along the same learning progression continuum for that generalized "essential" concept or skill.

"Zooming out" to larger grain size: Developing learning progressions for "within-year" planning and measuring progress towards proficiency

Hawaii's Learning Progressions Project
In 2007, the state of Hawaii received an EAG grant. The Hawaii investigation was defined in the Tristate EAG proposal as an interdisciplinary pilot to develop high quality, validated within grade-level performance indicators and performance tasks to measure progress and attainment of "hard-to-assess" students. Research questions included:

1. How could Hawaii improve access to the general education curriculum for ALL students, including those with disabilities?
2. How could Hawaii improve professional development for teachers in fully inclusive standards-based instruction and assessment models?
3. What frameworks, structures, and processes do we need for all students and teachers to be successful?

Hawaii, with support from national consultants with assessment and curricular expertise (including the National Center for Assessment, NCIEA), developed a process for exploring and testing use of classroom assessments for purposes of standards-based monitoring of progress toward proficiency (and beyond) of **all** children throughout the school year. The goal of these classroom formative assessment tools was to establish learning progressions to ensure the implementation of standards-based education, where **all** students have access to the same, challenging standards-based curriculum with appropriate supports to meet their academic needs. To support the project, tools were developed and refined to facilitate the implementation and delivery of standards-based instruction and assessment for student learning.

Using analysis of assessment data collected during 2007-2008, Hawaii is attempting to describe the K-8 continuum of skills and concepts for one reading and one mathematics strand (unifying thread) showing how students of all abilities could access the general education curriculum. Teacher action researchers in HI schools, with the support from outside content consultants, developed structured classroom-based tasks with specific rubrics to determine the initial entry level points and to guide instruction to get every student to meet or exceed proficiency of the grade level benchmark clusters. Teachers tracked both student progress and student needs and supports in order to establish and refine learning progressions.

While it has become very common for teachers to develop classroom assessments and "score" student work using rubrics or scoring guides, looking at the "evidence" of student thinking more closely - across groups of students and/or across time - provided more meaningful information than just the scores alone in developing learning progressions and monitoring progress. Several tools were developed to assist this work – draft learning progressions K-8, teacher and administrator feedback surveys, common formative and summative assessments, and data analysis tools. One analysis tool adapted for this purpose was the "Analysis to Action" tool, originally developed by Karin Hess and Marge Petit, the Center for Assessment (2003).

Background Information for "Analysis to Action" Template
The "Analysis to Action" template was created to serve *several possible purposes* that use learning progressions for making instructional decisions and documenting/measuring progress**:**

- To use student assessment data to "fill in the gaps" along the continuum of Learning Progression (or rubric) indicators: **Are there other important indicators that I have observed in student performance that I can add along the continuum that will guide my instruction?**

- To use Learning Progressions as a means for tracking progress of individual students across time (during school year, across several months): **Is *this student* moving along the learning progressions continuum? What instructional strategies are needed next?**

- To use Learning Progressions as a means for tracking and analyzing small group performance at a given point in time: **What instructional strategies are needed next – for some? For all?**

- To use Learning Progressions as a means for tracking and analyzing whole class performance at a given point in time: **What instructional strategies are needed next – for some? For all?**

The examples in the template show how the "Analysis to Action" tool can be modified to capture assessment information (through teacher observations and evidence in student work) for the different purposes described above.

The assessments used to clarify or validate learning progressions or to monitor progress during the school year need to be open-ended enough to capture the range of potential student performance and offer insights into student thinking and understanding. **This type of assessment also allows for the same assessment to be used more than once to look for development of expertise, rather than focusing only on mastery. For example, a formative assessment probe in science that asks students to identify examples and non-examples of living things and then explain why they were chosen provides a window into students' conceptual understanding and preconceptions beyond simply knowing or not knowing the correct answer**

The **Analysis to Action templates** can be found online at www.nciea.org.

"Zooming out" to the largest grain size: Using Learning Progressions to Monitor Progress across Grades: A Science Learning Progression Profile for PreK-4

Some Background Information
During 2005-2006, the New England Common Assessment Program (NECAP) science committee, using existing research in science learning and a variety of national curriculum and assessment resources, worked to clarify how science inquiry would be assessed at three targeted grade levels. Four broad areas of inquiry and specific related inquiry constructs were identified for assessment in the NECAP Science Assessment at grades 4, 8, and 11. For each broad area of inquiry, the specific constructs "look" somewhat different as appropriate to grades 4, 8, and 11 and are assessed as part of an inquiry performance task or an extended response task.

The four broad areas identified for science inquiry assessment in the NECAP Science assessment:

- ***Formulating Questions & Hypothesizing***
- ***Planning & Critiquing Investigations***
- ***Conducting Investigations***
- ***Developing & Evaluating Explanations***

Development of the Science Inquiry Learning Progression Profile
The (***draft***) learning progression example was developed for use in schools participating in the NECAP Science Assessment (New Hampshire, Rhode Island, and Vermont). The PreK-grade 4 Profile was designed starting with the specific inquiry constructs assessed in the NECAP Science assessment at grade 4. Informed by state curriculum standards and research, the grade 4 constructs were then "extended down" through grades 3 to PreK levels for each of the four broad areas of inquiry. Placement of specific inquiry skills at particular grade levels (PreK-3) is somewhat "negotiable" in that while they do represent a defensible continuum of skills, the grade level designations should be confirmed with each school district's science curriculum committee. In other words, all grade 4 students will have the same inquiry learning expectations on the NECAP assessment; however, each school team will determine how to align new and existing science curriculum units with skills along the continuum. In some cases, a skill might be moved to the adjacent grade level to indicate when mastery is expected for all students. These decisions of grade-specific expectations should be made school-wide or district-wide, but should not change what is expected for grade 4 students.

Using the LP profile
School/district teams work together to identify common units of study and assessments for tracking progress across grades. They also determine to what degree customized/individualized assessments will also be included for collecting assessment data.

The **Science Inquiry Learning Profile** prototype can be found online at www.nciea.org.

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