Topic 3: Technical Considerations for Developing Inclusive Assessments Based on Organized Learning Models

National Conf. on Student Assessment—Minneapolis
Patricia Almond and Neal Kingston
on behalf of the work group for topic 3
June 29, 2012
Topic 3: Technical Considerations Work Group

- Neal Kingston, Lead Facilitator
- Edward Roeber
- Carrie Mark
- Hillary Michaels
- Patricia Almond
- Phoebe Winter
- Sandra Warren
TOPIC 3 GUIDING QUESTION:

What technical considerations are important for developing Learning Progressions/Learning Maps for assessment of special populations?
“All models are wrong, but some are useful.”
George Box, 1979
A MODEL FOR TECHNICAL CONSIDERATIONS:
LAL—Alignment procedure for AA-AAS

Gen Ed Methods

Special Populations

What could the LAL model offer for LP/LM technical considerations & special populations?

**LAL Criteria:**
- Some criteria are similar to those in Gen. Ed. Asmts.
- Some Gen. Ed. Criteria were modified
- Additional unique criteria were added due to needs of eligible students

**Systematic Development:**
- Articulate alignment challenges specific to AA-AAS
- Explain the rationale for the LAL alignment criteria
- Describe procedures and methods
- Instantiate the model
Three Validity Concerns Regarding Learning Models

- Validity of the learning model itself
- Validity of using the learning model as the foundation for designing and developing assessments
- Validity of an assessment designed and developed based on the learning model
Levels and Purpose of Assessment

• **Summative assessments:**
  – Generally at the end of semester or school year to evaluate performance
  – Based on defined set of content standards.
  – Typically statewide (also national or district)
  – Usually part of accountability program

• **Formative assessment:**
  – Process Embedded in learning & linked to instruction
  – Daily, minute-by-minute
  – Provides feedback to adjust ongoing teaching and learning
  – Used to diagnose gaps in knowledge and understanding

• **Interim assessment (Benchmark):**
  – Falls between formative and summative assessment
  – Evaluates students’ knowledge/skills to set of academic goals,
  – Informs decisions at classroom (also school or district level)
  – Can be aggregated & reported at a broader level
  – May predict performance on summative assessment

Perie, Marion, Gong, & Wurtzel (2007)
What is the validity argument regarding learning models and assessment types?

<table>
<thead>
<tr>
<th>Validity of:</th>
<th>Assessment Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learning Model (LP/LM)</td>
<td><strong>Formative</strong></td>
</tr>
<tr>
<td></td>
<td><em>The LMs are credible.</em></td>
</tr>
<tr>
<td>Basing assessment development on Learning Model</td>
<td><strong>Interim</strong></td>
</tr>
<tr>
<td></td>
<td><em>The assessment design is credible.</em></td>
</tr>
<tr>
<td>The Assessment</td>
<td><strong>Summative</strong></td>
</tr>
<tr>
<td></td>
<td><em>The inferences are credible.</em></td>
</tr>
</tbody>
</table>
How will validity arguments for learning models, assessment types, and special populations look?

- **Rows:**
  - Learning model
  - LM for developing assessments
  - Assessments built w/LM

- **Columns:**
  - Formative
  - Interim
  - Summative

- **Slices**
  - General education
  - Special Education
  - English language learners
  - Students w/significant cognitive disabilities
What would a model for technical considerations in the general education literature look like?

- Field testing – do students follow LMs
- Refine LMs based on this evidence
- Empirical studies to see if LM-based instruction leads to improved mastery compared to conventional instruction
How Learning Progressions/Learning Maps are developed

Initially based on “systematic” examinations of relevant theory & research about how students learn a concept or topic.

– What do we know about the typical student’s entering understandings, misunderstandings and misperceptions?
– What do we know about the struggles students have with a particular concept?
– What have we learned about the steps students typically go through?

Theory and research findings guide development of hypotheses rather than conventional wisdom or consensus processes.

Learning Progressions in Science: An Evidence-based Approach to Reform
May 2009, CPRE Research Report # RR-63
Validity Claims for Assessments derived from Learning Models (Corcoran, Mosher, & Rogat, 2009)

• Validating assessments based on learning models is part of the process of developing learning models.
• Construct validity requires that assessments
  – report validly on students’ levels of progress and
  – discriminate reliably and validly between levels.
• Assessments need to define in explicit terms how students at each level express their knowledge and skill.
• Assessments derived from learning models are expected to positively influence instructional decisions.
How Learning Progressions/Learning Maps are *legitimated*

Although, *Scope and sequence* documents & curriculum frameworks are legitimated by the authority of experts, professional bodies, and government agencies. *Learning progressions* are legitimated by

- Gathering *evidence* through testing & they can be discredited
- *Field testing* to see if, in fact, most students do follow the predicted pathways when they receive the appropriate instruction &
- They should be altered and *refined based on this evidence*
- Studies also can be conducted to see if instruction based on learning progressions leads to improved mastery of learning targets over conventional instruction
In this science report on learning progressions (Corcoran, Mosher, & Rogat, 2009)

• There is a fundamental shift in the purpose of assessments derived from learning progressions
• Validity claims consider
  – reporting validly on students’ levels of progress and
  – discriminating reliably and validly between levels
• The focus is on improving instruction and learning

QUESTION: Does this science gen ed example inform a model for technical considerations of assessments derived from learning models and developed for students in special populations?
TOPIC 3 GUIDING QUESTION:

What technical considerations are important for developing Learning Progressions/Learning Maps for assessment of special populations?
"Hey, the elephant is a pillar," said the first man who touched his leg.

"Oh, no! it is like a rope," said the second man who touched the tail.

"Oh, no! it is like a thick branch of a tree," said the third man who touched the trunk of the elephant.

"It is like a big hand fan" said the fourth man who touched the ear of the elephant.

...
So the Topic 3 work group deliberated—*approach*

Does the process for evaluating validity of assessments derived from learning models follow the standard approach to evaluating validity for other assessments:

- *Validity* refers to the degree to which *evidence and theory support the interpretations* of test scores entailed by proposed uses of tests. The process of validation *involves accumulating evidence* to provide a sound scientific basis for the proposed score interpretations (*the Standards*)
So the Topic 3 work group deliberated—considerations

- What parts/levels/grain size of the learning model the assessment focuses on should be based in part on purpose of doing the assessment, and
- Different types of assessment may be appropriate for different parts/levels/grain sizes
- What you want to learn about students from the assessment should affect the design.
- Although, this is true for any assessment, with LM-derived assessments, what you want to learn about students may be different than what you can learn from traditionally-developed assessments
Design Based Research—Definition

*a systematic but flexible methodology aimed to improve educational practices through iterative analysis, design, development, and implementation, based on collaboration among researchers and practitioners in real-world settings, and leading to contextually-sensitive design principles and theories* (Wang and Hannafin, 2005, p. 6)

Educational Technology Research and Development
Volume 53, Number 4 (2005), 5-23, DOI: 10.1007/BF02504682
## Validation Plan for DLM Learning Map

<table>
<thead>
<tr>
<th>Activity</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Begin</td>
<td>February 2011</td>
</tr>
<tr>
<td>Review research literature</td>
<td>Ongoing</td>
</tr>
<tr>
<td>PreK-5 educator review</td>
<td>September 2011</td>
</tr>
<tr>
<td>6-12 educator review</td>
<td>January 2012</td>
</tr>
<tr>
<td>Special educator review</td>
<td>June 2012</td>
</tr>
<tr>
<td>Cognitive labs</td>
<td>July-December 2012</td>
</tr>
<tr>
<td>Expert review</td>
<td>October 2012</td>
</tr>
<tr>
<td>Pilot studies</td>
<td>January-December 2013</td>
</tr>
<tr>
<td>Empirical validation study</td>
<td>September 2014-May 2015</td>
</tr>
</tbody>
</table>
Learning Map (ELA and Math)

*Note – these will eventually be connected into a single map
Learning Map (Math)
Learning Map (Math)
*Note – the learning map can be filtered to view a small and more comprehensible section of the map.
Learning Map Filter (ELA)

ELA-795 Can organize words semantically

ELA-309 Can determine a new word meaning based on spoken context

ELA-232 Can correctly use a word inferred from spoken context

ELA-172 Can use discourse to enhance the representation of word meaning in text

ELA-629 Can use abstract nouns in communication

ELA-357 Can identify feeling words in text

ELA-1011 Can use verbs expressing cognitive states

ELA-460 Can rely on syntactic clues to determine the meaning of an unknown word when the definition is directly stated in the sentence

ELA-1013 Can use adverbs to modify cognitive states

ELA-387 Can identify similarities and differences between abstract ideas

ELA-1026 Can use abstract nouns in writing

ELA-1014 Can demonstrate understanding of adverbs expressing a range of magnitude and likelihood

ELA-1040 Can create a narrative that contains multiple episodes and a coda

ELA-1041 Can explain simple situations
So what does this mean for Topic 3 Technical Considerations

When it comes to special populations:

• How should one estimate the accuracy of scores derived from an organized learning model?
• Are alternate pathways used only by learners with specific diagnosable conditions?
• Are there dominant pathways used by all students who have access to that pathway or are there many relatively common pathways?
• What are the implications of the answers to questions above for technical considerations regarding assessments derived from learning models?
References


References continued


