Designing Continuous Interactive Assessments for English Learners and Others

An example of a Demonstration-Based Approach to Measuring Complex Constructs

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Introduction

- The two common state assessment consortia have a number of significant challenges ahead of them
  - Rigorous content standards have been developed in both English language arts and mathematics, with standards in areas such as science not far behind
  - Each consortium is moving towards universal online assessment
  - They both want to use a broader array of assessment tasks – more explanations, performance assessments, challenging problems with lots of language
  - Yet, there are a significant number of students who struggle with the text but are learning content—poor readers, English learners, students with learning disabilities in reading, and so forth
  - It is students such as these that often cause schools to not not make “annual yearly progress” (AYP)

The Problem

- For many of these students, typical accommodations are not sufficient. This includes
  - Typical *close-ended* item formats (within traditional or innovative tasks)
  - When automatic scoring routines of textual responses are used in *open-ended* formats.
- Simplified language is primarily effective for basic knowledge and skills.
- Oral accommodation ignores students' lack of sophisticated language structures and the 'shorthand' language of multiple choice answer options.
- These students share a difficulty accessing the language
  - in the problems

  AND
  - in the limited response genres within which students must respond.

Introduction

These students must (and should) participate in the state assessments…

- Can they participate in a way that permits them to show what they know and can do on academic assessments?
- Will the new state assessment consortia be able to create academic assessments – in mathematics, science, and perhaps language arts – that will prove to be on-grade level in rigor, yet accessible to these students with limited reading and writing capabilities?
- The conundrum is that that cognitively complex content is often intertwined with sophisticated language. Simplified language only goes so far.

Can Students with Limited Language Learn Complex Material?

Yes,

Because they and their teachers have learned to convey meaning using other semiotic representations as their primary communication methods.

What Might This Type of Assessment Look Like?

- For many using typical accommodations with traditional or most innovative tasks is not sufficient.
- This is because these students share a difficulty accessing the assessment language or being able to attend to it as it is
  - used in typical close-ended formats (within traditional or innovative tasks)
  - scored in general automatic scoring routines of open-response items.
- Problems with access occur in how tasks are presented AND in the types of limited response genres within which students must respond.
- This means successful adaptations would need to include accessible ways to both:
  - convey meaning to the student from the test maker
  - convey meaning from the student to the test maker

ONPAR

- One approach, called ONPAR, is designed to measure cognitively complex skills and concepts.

- It achieves this by using deliberate computer-interactive, multi-semiotic strategies for
  - building up and communicating the problem environment and target questions
  - designing response spaces that allow students to successfully demonstrate their knowledge and skills using a variety of methods.

- Instead of using general test formats (e.g. multiple choice or written response), ONPAR uses demonstration, continuous interaction, and related creation techniques to primarily convey meaning.

This approach to communicating meaning is distinct.

ONPAR's Architectural Approach

- Based on purpose and function, in designing a house or building the load-bearing walls are placed strategically in different configurations in order to make the structure stable and strong/defensible.

- Similarly, ONPAR distributes how it conveys meaning.
- This approach is fundamentally different from how meaning is conveyed through text, when language is used as the primary vehicle.

Architectural Design of Tasks

- The unique approach works because 4 interrelated environments are created within each ONPAR task, each defining techniques, development strategies, and evidence associated with it
  1. The Context Environment
  2. The Problem Environment
  3. The Target Question(s) or Statement(s)
  4. The Response Environment(s)

- Each environment activates particular cognitive processes to convey meaning using relevant representations at specified junctures.

- By designing tasks where meaning is explicitly and strategically introduced, supported, and distributed, complex concepts and skills can be assessed to and from the test taker in novel ways and with little language.

Architectural Load of Tasks

- Item writers
  - Identify the intended claims at the item/task level
  - Specify how this evidence can be translated onto the ONPAR screens
  - Conceptualize a suitable problem that addresses the claim
  - Determine how the ‘meaning loads’ need to be distributed across the presentation and response portions of the task
  - Determine how specific techniques can be used to successfully convey meaning

Substance Separation	Elementary Science
Puzzle	G4 Math
Roots and Shoots	Elementary Science
Density	Middle School Science
Soil Temperature	Elementary Science
Balance	G4 Math
Power Plant	Middle School Science
Fish Food	Middle School Science
Magnets Inquiry	Middle School Science
Magnets Classify	Elementary Science
Food Web Crisis	Elementary Science
Ramp Experiment	Middle School Science
Build a Shape	Math

ONPAR Randomized Trials

2008 Results in Science

Groups: lower English proficient ELs and non-EL control

Forms: Traditional and ONPAR

1. When controlled for science ability, low English proficient ELs (levels 1 and 2) scored *as well as* non-ELs on the ONPAR tests.
2. Significant differences between ONPAR and traditional forms for low English proficient ELs.
3. NO significant difference between forms for non-ELs.
4. Found similar findings in elementary and middle school.

ONPAR Randomized Trials

2009/10 Study in Mathematics

Groups: lower ELs, students with learning disabilities, struggling readers, others

Forms: Traditional and ONPAR

Results to date:

- When controlled for math ability, similar results to science with combination of students with learning abilities and poor readers and a combination of other SD students.
- Results look similar for low ELs but n too low so far.

Innovative Tasks

- Opening up the response avenues can be defended by linking intended claims and operationalized problems to demonstrate-able solutions.
- Like live performance and performance-based innovative tasks, approaches such as ONPAR can measure complex thinking, including meta-cognitive arguments, inferences, predictions, and complex causal chains in a repeatable administration mode that is also accessible.
- These types of task approaches can be designed to produce summative data, classroom-embedded, real-time formative information, or both.

Innovative Tasks

- To a lesser or greater degree, this type of computer-interactive task differs from static language-based task measuring the same content in
  - *Directness* to the latent construct underlying the content target
  - *Response* opportunities
  - *Density* of the cognitive demands (target relevant and avoid irrelevant)
  - *How* target cognitive processes are engaged.

  Some differences are important and some aren't. These need to be reconciled when both are used in assessment systems.

Effective Task Design

- The approach also specifies a reasonable framework for specifying how various kinds of innovative tasks might function. For instance,
  - As formative tasks, include a variety of feedback loops. Data from the environments could explain how the processes associated with accessing task aspects changes between loops.
  - For innovative tasks that use Bayesian or other scoring systems, the data points can be linked to techniques and environments activating particular processes.

Endnote

- A large percentage of students, including those with normal intelligence but language and related challenges, *can* and *do* learn the full range of challenging academic content.

- *Incorrect* approaches to testing that are gaining popularity are to
  - Measure only what such students can understand and respond to through language (i.e. lower level knowledge and skills)
  - 'Dumb down' the performance standards as a way of improving the way we test their cognitively complex knowledge and skills.
  - Offer accommodations such as oral reading that may not prove any more effective in helping students access the assessment questions or to respond to them.

- The key questions are:
  - These students have to (and should) participate in the state assessments, but will they participate in a way that permits them to know and can do?
  - Will the new state assessment consortia be able to create academic assessments – in mathematics, science, and perhaps language arts – that will prove to be academically challenging, yet accessible to these students with limited reading and writing capabilities?
  - How could this innovative work of WCER be used in the state assessment consortia's efforts?