Quick Tips

The four building blocks approach to quantify student learning outcomes

The BEAR Assessment System (BAS; Wilson & Sloan, 2000) provides a comprehensive, integrated, and systematic tool for quantifying student learning outcomes. It is grounded by four key principles guiding assessment development and includes four building blocks that are tools for constructing meaningful assessments aligned with curricular goals and instructional activities. The process is iterative, which means you are likely to move through all four building blocks several times as you quantify student learning outcome.

Building Block 1. Construct map – Designing the construct
- Focus on this question: What do we want to measure?
- Keep in mind that assessment should be based on a developmental perspective of student learning.
- Construct map is a visual metaphor for how the students develop and how we think about how their item responses might change.

Building Block 2. Item design – Writing Items
- Focus on this question: How are we going to observe it?
- Keep in mind that there must be a match between what is taught and what is assessed.
- Keep in mind that some items may be thrown out, so coverage is the key. When designing an instrument, the range should be covered throughout the instrument, not necessarily with every item.
- The best way to construct a fixed set of responses is to construct an equivalent open-ended outcome space first, then decide how to choose representative responses as the fixed responses.

Building Block 3. Outcome space – Scoring the items
- Focus on this question: What sense are we going to make of the responses?
- Keep in mind that teachers must be the managers of the system, and hence must have the tools to use it efficiently and use the assessment data effectively and appropriately.
- The categories that define the outcome space should be qualitatively distinct, well-defined, research-based, context-specific, finite and exhaustive, and ordered.
- The SOLO (Structure Of the Learning Outcome) taxonomy and the Bloom’s taxonomy can be used as a general theoretical framework that provide a frame of reference for judging and classifying students' responses.

Building Block 4. Measurement model – Examining the scored data quantitatively
- Focus on this question: How can we combine the item responses to get valid and reliable measures of student learning outcome?
- Keep in mind that reliability and validity evidence, evidence for fairness should be presented.
- Always draw the Wright map. The Wright Map is an aggregate map of all students' current proficiency levels versus all the item difficulties, oriented on the same logit scale.
General tips on the four building blocks approach

- Measure early and measure often.
  ✓ Three purposes here: instrument development, tracking student progress, and lessening measurement error
  ✓ The importance of pre-test measure (especially if the focus is on the CHANGE in student learning).
- Keep in mind that measurement done right is an iterative process – try to build this process into an evaluation design where you have limited time/resources.
- Four building blocks approach is not just for content learning in an educational context, but also for attitudes and stages of development. It also applies to other types of assessment, not just traditional paper-pencil.

References
