

Transcript – Diagnostic Assessments and Cognitive Engagement

The development of the ESTAR/MSTAR Diagnostic Assessments began with the articulation of the ESTAR/MSTAR Learning Progressions. The content of the diagnostic assessments is guided by the two ESTAR/MSTAR Learning Progressions we discussed earlier and designed to target different levels of cognitive engagement. After a student takes a Diagnostic Assessment, the report will identify which learning progression sublevels were associated with the student's answer choice. Since we are discussing the content portion of the assessment, let's look at what the National Research Council defines as cognitive engagement.

In addition to a complex representation of mathematical content from the ESTAR/MSTAR Learning Progressions which we have already discussed, items for the ESTAR/MSTAR Diagnostic Assessments were also designed to target different levels of cognitive engagement. Cognitive engagement refers to the level of cognitive processing through which students are expected to engage with the content. We use the taxonomy of cognitive engagement published by Kilpatrick, Swafford, and Findell (2001) from the National Research Council.

The strands include adaptive reasoning, strategic competence, conceptual understanding, productive disposition, and procedural fluency. It is vital to point out that all of the strands are interwoven and interdependent. The picture on the right shows this interdependence. Students' ability to be proficient in mathematics is dependent on each of these strands. However, if one of these strands is weak, it weakens the entire rope.

In order to get a true perspective of student proficiency within each ESTAR/MSTAR Diagnostic Assessment, all of the strands are assessed except for productive disposition. Productive disposition is not assessed because this strand evaluates how a student perceives a math problem, which cannot be assessed in a multiple choice format.

When a student is given the MSTAR Universal Screener, it only communicates whether he got an answer right or wrong, not why he missed the question. However, when a student is given the ESTAR/MSTAR Diagnostic Assessment, it will help communicate why he is struggling with a concept. For example, it may help identify if he is making a conceptual or procedural error, if he is using an inappropriate strategy to solve a problem, or if he struggles to reason abstractly.