Using Item Analysis for Assessments in the Classroom
Purpose of Item Analysis

- Diagnostic
- Improve Test Design
- Longitudinal Department Study
Diagnostic Uses of Item Analysis

- In which topics are the students proficient?
- Can I pinpoint student mistakes and struggles?
- Which students should be grouped together?
Proficiency

- Proficient does not mean that every student answers the question correctly.
- If a question is answered correctly by every student, it is probably not a very good diagnostic tool and should be disregarded or rewritten.
Improving Tests Through Item Analysis

- Teachers must think about what standard or skill each question is testing.
- Were the questions and answer choices well written?
- Were any questions so poorly written that they should be disregarded from the exam score?
- Well written questions can become a question bank for writing future exams.
Proper Answer Choices

- All answer choices on multiple choice tests should be plausible and distracting to students.

- Distractors that are not chosen by any student should be removed from a test because they do not help the teacher to tell the difference between proficient and struggling students.
Poorly Written Distractors

Following is an altered Living Environment Regents question:

The genetic code of a DNA molecule is determined by a specific sequence of
(1) ATP molecules (2) sugar molecules
(3) chemical bonds (4) communication between cells

The correct answer is choice 1.
Poorly Written Distractors

- After an item analysis, we find that all students chose answers (1) or (2).
- Students may have ignored answers (3) and (4) because the word molecule, which appears in the question, did not appear in those answers.
- Choice (4) is actually not related to the topic of the question and should not have been a choice.
Poorly Written Distractors

- In effect, this question was not a 4 choice question, but a 2 choice question, where students had a 50% chance of guessing correctly.
Poorly Written Distractors

- Even if 80% of students answered this question correctly, can we be sure the students know the material?
- How many of the students knew the answer and the others had an easy time guessing based on the answer choices?
Disaggregation of Data

- An item analysis performed on an entire class can provide useful information, but it may not tell the whole story.
- Different groups within the class may have answered questions in different ways.
- Studying the data of these groups separately is called disaggregation.
Creating Subgroups

- Subgroups of the class can be determined in many ways
  - Top 50% of student scores on this test compared to the bottom 50%
  - Total GPA
  - Subject area GPA
  - Last test score
  - Eighth grade test score
  - And others
Example of Disaggregation

- Jamie is 5 years older than her sister Amy. If the sum of their ages is 19, how old is Jamie? Source - NYS Math A June 2002

- (1) 5    (3) 12
- (2) 7    (4) 14

- The correct answer is choice (3), 12
Aggregated Item Analysis

- In our initial data analysis, we find that the most common choice of incorrect answer was choice (4), 14. This could lead to a review of the question which focuses on the subtraction of the two numbers given in the question.
Disaggregated Item Analysis

- If we disaggregate the findings, we find that the most common choice of incorrect answer of the top 50% of scores in the class was choice (2), 7.
- The most common choice of incorrect answer for the bottom 50% was choice (4), 14.
Disaggregated Item Analysis

- The disaggregated findings show us that most students in the top half of the class were able to find Amy’s age, but didn’t find Jamie’s.

- This analysis provides us with a very different outcome from that of the entire class.
Disaggregated Item Analysis

- Findings for the top half of the class:
- The majority of the wording was understood and followed
- The mathematics was understood
- Did they read the entire question?
- How can they indicate which answer they need to find to stay on track?
Disaggregated Item Analysis

- Findings for the lower half of the class:
- The wording of the question was not understood
- It is unknown if they can do the mathematics involved
- How can they indicate which answer they need to find to stay on track?
The disaggregated data allows the teacher to become more familiar with the needs of their students.

Teaching can concentrate on the areas students are struggling with, instead of broad brushing the review and hoping for the best.