Measurement provides us with powerful tools that we can use to improve our tests from the perspective of both students and teachers. This article provides tips for using these measurement tools for both items and tests.

**Item analysis** refers to methods used to review and improve the items in our tests.

**Test review** refers to techniques we can use to examine the stability and appropriateness of each test as a whole.

### 4 Tips for Item Analysis

1. **Know the item difficulty**

   Item difficulty can help you set the appropriate expectations when measuring student knowledge. This can help you check the appropriateness of items and associated skills for your class or grade level and identify gaps in instruction.

2. **Look for problematic items**

   The item discrimination can tell you if items are confusing or possibly even miskeyed. Look out for correct answers with negative discriminations as they are problematic and should be revised before further use or just removed from the test.

3. **Make sure the distractors are plausible**

   Look at the distractors (incorrect choices) for each item to see if students are selecting each choice at a similar rate. If some distractors are not being chosen then they are not a reasonable option and should be reviewed.

4. **Integrate feedback from instruction**

   The item analysis is enhanced if feedback from teachers and students is used to support an item review. Teacher and student feedback can identify items that are inappropriate for the current skill level and whether the test is balanced in length.
4 Tips for Test Review

1. **Build assessment confidence using reliability**

   Obtain the test’s reliability coefficient. This tells you how consistent your test scores are and can provide the teacher with confidence that the test they are using is of the highest quality.

2. **Seek to improve reliability**

   Cronbach’s alpha reliability can be improved using Tips 1–3 discussed in the previous section. Consider an item analysis and find ways to improve the test for the next testing session.

3. **Check the test’s validity**

   What evidence supports your interpretations of the test scores? A review of the literature or verification that your items are linked to the right skills and standards can inform you how much validity your test has.

4. **Support your test plan using validity**

   The body of evidence behind your test can provide evidence that your test plan and content is appropriate for the students you are measuring. Consider making revisions to the test plan if the test review reveals that the test content is not appropriate.

These tips provide a solid foundation to improve the quality of your assessment at both the item and test level. Test improvement is an ongoing process that requires feedback from the item development and exam form creation stages of the assessment development cycle.

**Understanding Key Psychometric Terms**

Review the terms below for a quick reference covering some common psychometric terms, including interpretative guidelines.

<table>
<thead>
<tr>
<th>Statistic/Term</th>
<th>Definition</th>
<th>Range</th>
<th>Interpretative Guidelines</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proportion</td>
<td>Total responses for option divided by total sample size</td>
<td>0 to 1</td>
<td></td>
</tr>
<tr>
<td>Item difficulty (p</td>
<td>Proportion of sample that chose keyed (correct) answer</td>
<td>0 to 1</td>
<td></td>
</tr>
<tr>
<td>value</td>
<td></td>
<td></td>
<td>Should see similar values for each option</td>
</tr>
<tr>
<td>Distractor p-value</td>
<td>Proportion that endorsed the non-keyed option(s)</td>
<td>0 to 1</td>
<td></td>
</tr>
<tr>
<td>Correlation</td>
<td>Statistic that indexes the relationship between two variables.</td>
<td>-1 to 1</td>
<td>Positive correlation: as one variable increases, the other variable tends to increase also</td>
</tr>
</tbody>
</table>
### Statistic/Term

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<tr>
<td>Item discrimination (point-biserial)</td>
<td>Correlation between keyed response and total score</td>
<td>-1 to 1</td>
<td>Below .10 → Review Item</td>
</tr>
<tr>
<td></td>
<td></td>
<td>.10 to .19</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td></td>
<td>.20 to .29</td>
<td>Good</td>
</tr>
<tr>
<td></td>
<td></td>
<td>.30+</td>
<td>Very Good</td>
</tr>
<tr>
<td>Distractor point-biserial</td>
<td>Correlation between non-keyed option and total score</td>
<td>-1 to 1</td>
<td>Want values less than .10</td>
</tr>
<tr>
<td>Cronbach’s alpha reliability coefficient</td>
<td>Statistic that indexes the consistency of test items</td>
<td>.70 to .79</td>
<td>Acceptable</td>
</tr>
<tr>
<td></td>
<td>(Indicates if items are measuring the same general skill)</td>
<td>.80 to .89</td>
<td>Good</td>
</tr>
<tr>
<td></td>
<td></td>
<td>.90+</td>
<td>High</td>
</tr>
<tr>
<td>Validity</td>
<td>Theory that supports our interpretation of test scores</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### How can Scantron help?

Scantron has an extensive track record of providing assessment services to help thousands of customers succeed in their assessment programs. We were one of the first partners to align our existing item banks to the Common Core State Standards—and we were one of the first to provide item and assessment banks designed *from the ground up* to fully support those standards. We’ve helped districts with workshops and consulting on a variety of assessment topics and content development processes, as well as working with customers to provide high-quality content aligned to their chosen standards. We’ve validated educator assessment efforts and demonstrated positive impact to student learning with research studies ranging from determining growth targets to predictive validity studies.

One critical challenge is to develop an assessment plan that fulfills all of the needs of a district’s educators. This process might include developing a plan for custom assessments that includes creating an assessment blueprint and effective test items to accurately measure student achievement. It might also include aligning district-created items to a particular set of national or state standards. Scantron can develop these deliverables using the same proven assessment development process we follow to create our own item banks and assessments—or you can choose to incorporate existing Scantron materials into your plan. If you want to play a more active role in assessment creation, Scantron can assist with a variety of professional development activities that will instruct educators in how to create test blueprints and develop assessment items.
Last, if linking district test results to state test results or performing other studies is important, Scantron’s psychometric and research team can help.

Another key element is providing support to build district team capacity and inform Professional Learning Communities (PLCs). Scantron can develop your assessment elements—and we can provide consulting and workshops on a variety of topics, including:

- Blueprint development
- Item development plan
- Item writing and review
- Bias and sensitivity review
- Test form creation and delivery
- Statistical analysis and interpretation of results
- Custom research projects

Whatever the assessment assistance you need, Scantron has the products, tools, and expertise to help you ensure that you have the right program for your students. Our comprehensive suite of assessment services helps you make the most out of your assessment development process. Whether you want to do it yourself with in-house experts and just need a little support or whether you want a partner to guide you through the process, Scantron can meet you where you are and help get you to where you want to be.

**Contact Us:**
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www.scantron.com
Scantron Corporation. 1313 Lone Oak Road, Eagan, MN 55121

**Don’t just take our word for it! Some quotes from our clients:**

“[Scantron] not only helped write, edit, and review test items for our core content areas, but they’ve helped orchestrate the field testing and the psychometric review of these items so that they pass a single parameter model.”

Thea Andrade,
Assistant Superintendent of Curriculum, Assessment, and Instruction,
Phoenix Union High School District, AZ

"Scantron has provided the tools needed to validate student learning and support teacher decisions to move students to the next Performance Level when they are ready."

Dr. Oliver Grenham
Chief Education Officer, Adams County School District 50, CO