Using Test Assessment Data to Improve Student Performance

Dr. John E. Hohman

Thursday, March 25
From 8:00 to 9:30 am

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Content

- Starting Points/The Beginning
- Testing Difficulties
- Test Anxiety
- Written Tests
- Performance Tests
- Sample Course
- Compiling Course Data
- Summary of What We Learned
Pre-Assessment

- Five Questions
- Choose only 1 best answer
- Record your responses
- You will score yourself
- I will be asking for participant hand counts

Ready?
Pre-Assessment Key

- Were the questions hard?
- Did you notice anything different about the format of the question or answers?
- Are you ready for the answers?

Answers

Note: This pre-assessment was offered to do the following:
1. Show what could be done with a quiz format; and what not to do.
2. Stimulate discussion
3. Minimally, assess participants knowledge.

If you have questions, contact me by email: edempco@netonecom.net
How can “data” be used to improve student performance?

- When the data is accurate.
- If the data can help to correct or remediate student performance.
- When it is available before a final grade is given.
Laying a foundation ...

- Good tests are ...
- Competencies are ...
- Contextual learning is ...
What types of things generate student data?

Predominantly:
- Written tests
- Performance tests.

Secondarily:
- Observation
- Oral communication
- Self assessment
- Peer assessment
- Third party assessment.
How is student data “traditionally” recorded?

Predominantly:
- Lab/Project scores
- Test results
- Final grades.

That Include:
- Lab work
- Projects
- Homework
- Quizzes
- Written tests.
“Tests provide a measure of how well students are learning.”

ETS
“An educational institution is a place to learn and make mistakes …

not a place where final judgment is administered.”

J.E. Hohman
Problems with Tests

- Teacher made written tests are generally not valid and under perform.
- Performance evaluation (in school or in the work place) is typically bias.
- National tests are typically devoid of contextual relationships (example).
- Other forms of testing are rarely used.
Written Tests

Need to be checked for:

- Links to learning objectives or competencies
- Test Structure
- Test bias
- Reliability
- Validity
- Fairness.
Performance Tests

Need to be checked for:

- Links to kinesthetic behavior
- Outcomes that are based on Process or Product
- Inter-rater reliability
Test Anxiety

- What is test anxiety?
- What causes anxiety?
- Is there anything that can be done to reduce test anxiety?
Let’s Visit A Sample HVAC Electrical Course

Where:

- Course objectives are linked to outcome measures
- Contents of written tests are given to students the first day of class
- Performance is stated and all performance exercises are shared with students on the first day of class.
Course #: HVAC 117

- Course syllabi
- Cross-walk Course Outline to Objectives
- Table of Test Specification – Written Test
- List of Lab Exercises
- Performance Test

Note: These materials are offered, but may need further explanation. If you have questions, contact me by email: edempco@netonecom.net
Compiling HVAC 117 Data

Student progress is continually monitored through:

- Assignments
- Lab work
- Quizzes
- Written tests
- Performance tests
- Final grades - Grade Book

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What Have We Learned?

- There are some additional things that should be done to improve classroom written assessments.
- Performance assessments need to be directly linked to laboratory exercises.
- Contextual learning and assessment are important.
- Course data needs to be accessed continually.
Increase Student Knowledge by

- Provide a table of test specifications
- Providing practice for written test taking
- Pre-test using quizzes
- Pre-test using verbal questioning
- Categorize & group knowledge.
Increase Student Performance by ...

- Giving students all scoring and grade information at the beginning of the course
- Providing for student self assessment
- Make scores available and accessible
- Provide opportunities to improve scores.
Increase Student Contextual Understanding by

- Role modeling knowledge
- Demonstrating performance
- Displaying/practicing soft skills
- Provide contextual scenarios.
Conclusion

We have covered the following:

- Starting Point – The Beginning
- Testing Difficulties
- Test Anxiety
- Written Tests
- Performance Tests
- Sample Course
- Compiling Course Data
- Summary of What We Learned.
Thank You

Time’s up!
Dear Candidate:

The results of the grading are as follows:

### Residential A/C & Heating Exam

<table>
<thead>
<tr>
<th>Section</th>
<th>Your Score %</th>
<th>Your State %</th>
<th>National %</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Core (30)</strong></td>
<td><strong>83%</strong></td>
<td>69%</td>
<td>72%</td>
</tr>
<tr>
<td>Safety, Tools, Soft Skills (6)</td>
<td><strong>100%</strong></td>
<td>71%</td>
<td>70%</td>
</tr>
<tr>
<td>Heat Transfer &amp; Comfort (5)</td>
<td><strong>80%</strong></td>
<td>71%</td>
<td>73%</td>
</tr>
<tr>
<td>Electrical (19)</td>
<td><strong>79%</strong></td>
<td>68%</td>
<td>69%</td>
</tr>
<tr>
<td><strong>Air Conditioning (25)</strong></td>
<td><strong>92%</strong></td>
<td>64%</td>
<td>67%</td>
</tr>
<tr>
<td>Installation (3)</td>
<td><strong>100%</strong></td>
<td>54%</td>
<td>59%</td>
</tr>
<tr>
<td>Service (11)</td>
<td><strong>82%</strong></td>
<td>70%</td>
<td>71%</td>
</tr>
<tr>
<td>Components (7)</td>
<td><strong>100%</strong></td>
<td>81%</td>
<td>77%</td>
</tr>
<tr>
<td>Applied Knowledge (4)</td>
<td><strong>100%</strong></td>
<td>81%</td>
<td>77%</td>
</tr>
<tr>
<td><strong>Air Distribution (25)</strong></td>
<td><strong>92%</strong></td>
<td>66%</td>
<td>70%</td>
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<tr>
<td>Installation (8)</td>
<td><strong>100%</strong></td>
<td>72%</td>
<td>75%</td>
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<tr>
<td>Service (5)</td>
<td><strong>80%</strong></td>
<td>53%</td>
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<td>Components (6)</td>
<td><strong>100%</strong></td>
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<td>Applied Knowledge (6)</td>
<td><strong>83%</strong></td>
<td>60%</td>
<td>65%</td>
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<thead>
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<th>Section</th>
<th>Your Score %</th>
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</thead>
<tbody>
<tr>
<td><strong>Heat Pumps (25)</strong></td>
<td><strong>76%</strong></td>
<td>51%</td>
<td>60%</td>
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<td>Installation (4)</td>
<td><strong>50%</strong></td>
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<td>Service (11)</td>
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<td>60%</td>
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<tr>
<td>Applied Knowledge (3)</td>
<td><strong>67%</strong></td>
<td>63%</td>
<td>68%</td>
</tr>
</tbody>
</table>

| **Gas Furnaces (25)**          | **88%**      | 67%          | 67%        |
| Installation (5)               | **80%**      | 70%          | 68%        |
| Service (11)                   | **91%**      | 66%          | 64%        |
| Components (6)                 | **83%**      | 64%          | 64%        |
| Applied Knowledge (3)          | **100%**     | 73%          | 66%        |

| **Oil Furnaces (25)**          | **76%**      | 68%          | 65%        |
| Installation (4)               | **100%**     | 69%          | 65%        |
| Service (11)                   | **64%**      | 71%          | 62%        |
| Components (7)                 | **71%**      | 59%          | 56%        |
| Applied Knowledge (3)          | **100%**     | 81%          | 75%        |

The section(s) of the exam you passed are shown above in a box. The number of questions for the section is in parenthesis.

In order to receive an Industry Competency Exam certificate, you must receive a score of 70% or better on the Core section and a score of 68% or better on a Specialty.

If you did not meet the required percentage for a section(s) for which you tested, we hope you choose to retake the section(s).

Please check with your instructor for the next available test date.

May we express our appreciation for your interest in the Industry Competency Exam(s) and look forward to your successful future scores.
Web Sources

Four Classes of Reliability

1. **Internal Consistency Reliability**
   Used to determine the consistency of results across all items within a test.

2. **Test-Retest Reliability**
   Used to determine the consistency of a test given at different times.

3. **Parallel-Forms Reliability**
   Used to determine the consistency of two different tests that were intended for the same purpose and used the same test specifications.

4. **Inter-Rater or Inter-Observer Reliability**
   Used to determine the differences/similarities between raters/observers.
Anatomy of a Item

Stem
Which of the following statements is a representation of Ohms law?

Correct Answer
a. Flowing water loses pressure because of resistance

Distractors
b. Refrigerant flow is based on amps used
c. Pressure and temperature have an “inverse” relationship
d. Photons striking a photovoltaic cell, reduce resistance to flow
Good Tests Exhibit:

- Test construction based on a prescript (objectives & goals; short & long term learning)
- Assessments that do not over tax the learner (reasonable test time)
- Increase test taker concentration (reduce cognitive load; related to item and distractor order)
- Simple question structure, consistent with the level of the assessment (recognition, recall, problem-solving, comprehension, and analysis)
Good Tests Exhibit: (cont. 2)

- Consistent item structure (# of distractors [3 to 4], grammar, & distractor length)
- Relevant and plausible items (directly represent the content of the test)
- Previously untested knowledge or performance (no known items)
- Eliminate items that are: Negative; All/None & Always/Never responses; direct quotes; and opposite alternatives
Good Tests Exhibit: (cont. 3)

- Content related items (no give-aways)
- Items devoid of clues (to the question or to other questions).
Measures of Tests

- Reliability – a measure of consistency that relates items to a test or one test to another (.65 to 1.0) [Four Classes]

- Validity – a measure of connection between the test items and the test content (.50 to 1.0) [Six Types]
Competencies

Three definitions:

- Knowledge, skill, ability, or characteristic needed to perform a function (Desire2Learn)

- A collection of characteristics (i.e. skills, knowledge, self-concept, traits and motives), that enables us to be successful in our interactions with others at work, school, home, and in our community at large. (MIT Career Development Center)

- Competencies are defined in terms of the behaviours exhibited by a person with those characteristics. (New Zealand Govt)
“According to contextual learning theory, learning occurs only when students (learners) process new information or knowledge in such a way that it makes sense to them in their own frames of reference (their own inner worlds of memory, experience, and response). This approach to learning and teaching assumes that the mind naturally seeks meaning in context, that is, in relation to the person's current environment, and that it does so by searching for relationships that make sense and appear useful.” (Hull [1993] NCREL & CORD)
Face Validity

Face validity measures the structure of a test to determine if it appears to be a test of the general content. It seeks to answer the question; Does this test appear, "on its face", to be a good representative test of content.
Content Validity (2 of 6)

- **Content validity** measures the connectedness of the test with the instruction content. It seeks to answer the question; Does this test measure what it was designed to measure?
Predictive Validity (3 of 6)

- Predictive validity measures the ability of a test to replicate the same results. It seeks to answer the question; Does this test generate the same data with other administrations of the test?
Concurrent Validity (4 of 6)

- Concurrent validity seeks to measure the correlation of test items. It tries to answer the question: Are test items answered similarly by representative groups?
Convergent Validity (5 of 6)

- Convergent validity seeks to measure the amount of similarity one test has with another of the same type. It tries to answer the question; Does this test measure the same content as another similar test?
Discriminant Validity (6 of 6)

- Discriminant validity determines how well test items discriminate test participants. It answers the question; do the people who score best, also get these items correct?
Fairness

- Fairness in education is generally described as providing comparable opportunity for learning the content of a test and in the administration and scoring of the test.

- Fairness in employment testing has to do with how the test is used to identify (discriminate) knowledge across a diverse group of people.