
Innovative Solutions for Creating Certification Exams and Setting Cut Scores

Lori Schantz, M.A.

Brian Katz, Ph.D.

David Katkowski, M.A.

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Overview of Certification Testing and Pass Score Setting

Lori Schantz
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Purpose of Symposium

- Provide an overview of the traditional process used to develop certification exams and set a pass score
- Discuss innovative solutions to a variety of challenges encountered with certification development

Steps in the Process

- Job analysis
- Blueprint development
- Item development
- Content validation
- Cut score setting
- Examining item and test statistics

Job Analysis

- Review materials on occupation
- Conduct individual interviews with job incumbents
- Conduct workshops
- Develop and administer survey
- Survey results used to:
 - Identify tasks and knowledges most critical to the job
 - Determine weight of each task and knowledge category

Blueprint Development

- Survey results become the exam “blueprint” for the certification examination
- Focus of exam blueprint is on the areas of knowledge, rather than the tasks
- Strength of multiple-choice exams is the ability to tap into job knowledge

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Item Development

- Review exam blueprint
 - Verify weights for each knowledge are appropriate
- Review and develop items
 - Review items that already exist
 - Development of new items by subject matter experts (SMEs) or exam development staff
 - Items must cover breadth of blueprint

Content Validation

- SMEs asked to rate:
 - Importance of the item content, and
 - Problems resulting from lack of knowledge required to answer item
- Items dropped from item bank if given low content validation ratings

Cut Score Setting

- Norm-referenced vs. Criterion-referenced
- Modified Angoff
- Borderline Candidates
- Practical Exam Development

Two approaches

- Norm-referenced (grading on a curve)
 - Judgments about exam takers
- Criterion-referenced
 - Judgments about exam content

Norm-referenced

- Cut score set based on how individuals performed relative to others who took the test at the same time
- Some percentage of examinees will fail and some will pass regardless of the level of knowledge that they demonstrate
- The cut-score shifts from test to test according to how well the group taking the test performed

Criterion-referenced

- Cut score set according to absolute standard of performance
- Test-takers graded against a constant level of performance so that all the test-takers might pass or fail an exam
- Method links the performance on the test back to some minimum performance standard of the job

Modified Angoff

- A criterion-referencing method
- Requires a panel of experts (SMEs) to:
 - Define acceptable performance standards for the professional population
 - Make judgments about the probability that a minimally competent test taker will correctly answer each test question

Modified Angoff (continued)

- Borderline Candidates are *minimally competent*
 - Someone who is *just* competent enough to be certified
 - Someone who just meets the performance standards as defined by the examination panel
- Panel members are experts in the profession and familiar with what competent performance on the job entails

Modified Angoff (continued)

- Process for SMEs making Angoff rating:
 - Make first estimate
 - Share first estimate
 - Told the correct answer
 - Given actual performance as a “reality check” (i.e., past item statistics)
 - Discuss all information
 - Make final estimate

Modified Angoff (continued)

- Advantages of the Angoff method:
 - The process is conducted at the item level
 - Efficient means in developing new exam forms

Practical Exam Development

- Construct exam based on set cut score (e.g., often 70% in public safety jobs)
- Construct exam then calculate cut score (e.g., mean of Angoff ratings)
- Final aspect of cut-score setting process is examining the results of the exam

Results

- Following these steps with care with result in an instrument that is:
 - Job specific
 - Content valid
 - Accepted by those who perform the job
 - Accepted by those attempting to attain certification

Allows candidates to demonstrate knowledge and skills necessary to perform the job

Overcoming Challenges in Developing an Oral Exam and Pass Score: A Case Study

Brian Katz

Human Resources Research Organization
(HumRRO)

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The American College of Veterinary Surgeons (ACVS)

- Provides 3-day certification exam once a year to 80 – 100 candidates
 - Separate exams for Large Animal and Small Animal candidates
 - Exam consists of 3 sections
 - Written Exam
 - Practical Exam
 - Oral Exam

Oral Exam

- Tests surgical principles and case management prior to, during, and after surgery
- Soft Tissue and Orthopedic sections of exam
 - 25 minutes to complete each section
- Incorporates visual information
- “Reveals” occur several times throughout each exam

Logistics of Oral Exam

- All exams occur in one day
- Examinees “sequestered” prior to exam
- Administered by two examiners
 - 6 sets of examiners for the Small Animal Exam
 - 4 sets of examiners for the Large Animal Exam
- Administered in hotel rooms

Problems with Oral Exam

- Ambiguous questions
- Differences in administration style
 - Prompting
 - Quality and quantity of feedback
- Differences in scoring
 - Different interpretations of correct answers
 - No collaboration between examiner teams
- Differences in examiner familiarity with exam
- Familiarity conflicts between examiners and examinees

Three Ways to Overcome Problems

1. Standardize
2. Standardize
3. Standardize

Fourth Way to Overcome Problems

4. Standardize

Training of Examiners

- Collaborate to finalize exam
- Focus on stylistic differences in exam administration
- Extensive role-play training

Create an Exam Script

- Read questions verbatim directly from script
- Identify acceptable prompts to ask for each question
- Provide a “checklist system” for scoring while administering the exam

Other Standardizing Techniques

- Eliminate conflicts-of-interest between examiners and examinees
- Audio tape each examinee
- Immediately resolve scoring disagreements following each exam
- Breaks after every four examinees to confer with other examiner teams

So we've standardized the exam...

But we still need a pass score!

Setting the Oral Pass Score

- Initially set the pass score using the Angoff technique
- Encountered problems using the Angoff technique for the oral exam
 - Pass scores too high
 - Time consuming
 - Logistical difficulties

The Border Group Method

- Developed to overcome challenges encountered with Angoff approach
- 2 steps to Border Group Method
 - Step 1: Develop 3 score categories
 - Step 2: Decision exercise to set pass score

The Border Group Method - Step 1

Develop 3 score categories

- 3 score categories
 - Clearly Fail: 0 – 59% correct
 - Border Group: 60 – 75% correct
 - Clearly Pass: 76 – 100% correct
- Score categories based on historical data of pass score location
- Visually display examinees' scores in the border group

Test Score (%)		# of Candidates	Candidate ID Numbers	Pass/ Fail
0-59	→	7		<i>FAIL</i>
60	→			
61	→	1	818933	
62	→	1	918811	
63	→			
64	→			
65	→	1	101774	
66	→			
67	→			
68	→			
69	→			
70	→	1	052702	
71	→	2	020455, 953422	
72	→	2	052702, 111970	
73	→	1	432857	
74	→			
75	→	1	062873	
76-100	→	12		<i>PASS</i>

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The Border Group Method: Step 2 Decision Exercise

- As a group, review the exams that fall at natural breaks in the border group
- If exams should pass (fail), move lower (higher) in the border group
- Once pass score is identified, listen to tapes of candidates immediately above and immediately below the pass score

Impact of Border Group Method

- More efficient process
- Greater face validity
- Greater acceptance by ACVS
- Eliminated need to adjust pass score

Next Steps

- Convert the oral exam to a paper & pencil format
 - No advantage to keeping the exam in an oral format
- Incorporate additional technology into the exam

The End

Using Technology to Combat Common Challenges in Certification Testing

David Katkowski

Human Resources Research Organization
(HumRRO)

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Challenges

- Tight budgets
- High quality product
 - Set appropriate cut scores
 - Maintain item bank
 - Review/Write items

Tools

- MS Excel
- MS Access
- Web Conferencing Service

Tools: MS Excel

- Angoff cut-score setting session
 - Challenges:
 - Expensive
 - Hard to do well
 - Tool:
 - Angoff spreadsheet

Angoff Spreadsheet

- Advantages
 - Running Angoff calculation
 - Real-time ratings information
 - Minimal preparation time
 - Versatile data filtering and entry
 - Easy to use

[Demo](#)

Angoff Spreadsheet

- Limitations
 - Moderately difficult to develop (mostly the bells and whistles)
 - Can easily sort incorrectly if you are not careful

Tools: MS Access

- Maintain item bank
 - Challenges:
 - Security concerns
 - Efficiency concerns
 - User friendliness – can everyone use it?
 - Way we used to do it
 - Not user friendly
 - Time consuming
 - Quality control difficult

Tools: MS Access...cont.

- Maintain item bank
 - Tool: gitemReviewer

gltemReviewer

- Advantages
 - Manages all test item information in one place (statistics, previous versions of items, correct answer etc.)
 - Expedites the item writing/review/editing process
 - Create/Print test forms
 - Easy to use

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gltemReviewer

- Limitations
 - Difficult to develop
 - Some support needed
 - Statistics calculated outside of database
 - Problems with exporting items with formatting

Tools: Web Conferencing Service

- Catch all for saving money
 - Can utilize Excel and Access
 - No need for some face-to-face meetings
 - Inexpensive and easy to use

[Demo](#)

Questions?