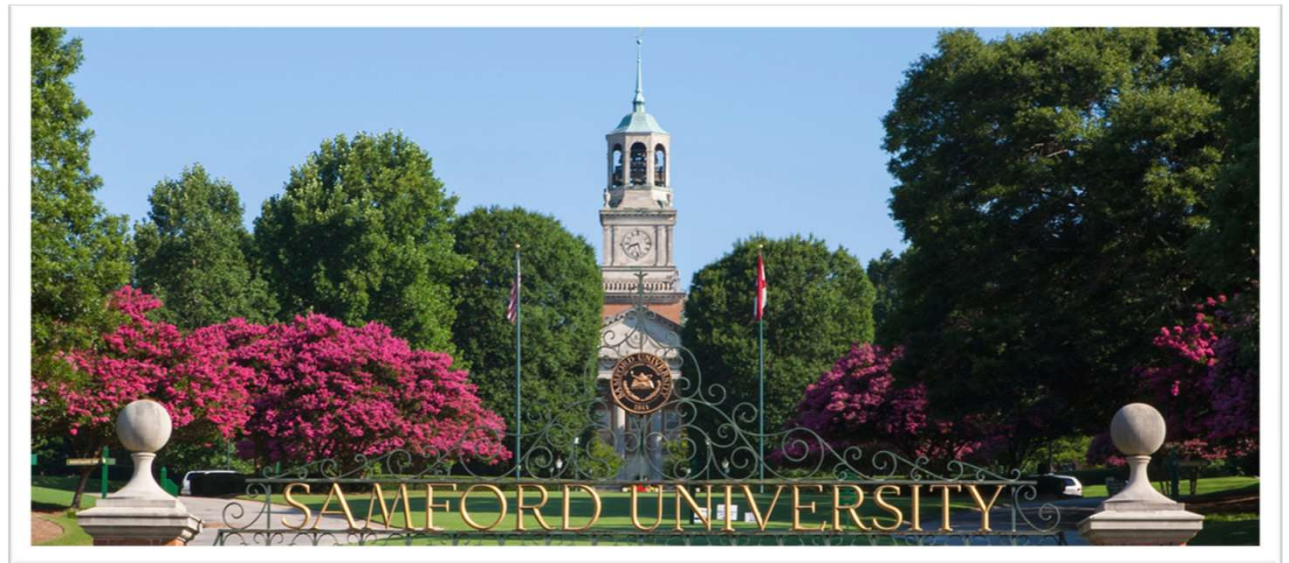# Development of an Annual Competency-based Assessment for a Professional Degree Program

Elizabeth A. Sheaffer, MBA, PhD
Associate Dean for Assessment & Accreditation
Samford University McWhorter School of Pharmacy
Birmingham, Alabama

- Develop a basic **framework** (minutes per question; scoring; blueprinting) for a comprehensive evaluation.

- Recognize how to use online testing software to assist in **question bank** development.

- Designate **reliability and validity** studies that will be conducted before and after the assessment.

BACKGROUND

BACKGROUND

- **Implemented new curriculum in fall 2021**
  - 4-year professional degree program
  - New curriculum model
  - Competency-based design
  - Several years of planning

- **Accreditation standards**
  - Evaluate students' progress other than by course grades
  - National exam – pros and cons
  - Decided to administer the national exam _and_ an in-house exam

METHODOLOGY

Design

- New curriculum → program competencies → courses to teach the competencies
- New annual internal program-level exam to measure student competence
- **SCOPE** = **S**chool **C**ompetencies and **O**bjectives **P**rogress **E**xamination

Assessment Committee
- Test **length** (time, count, minutes per question)
- **Scoring** (weighting, distribution, scaling, and performance levels)
- Competency **blueprint** draft
- **Validity** and **reliability** measures

Test Length & Location

- **Time**
  - Desired length – approximate length of 2-3 hours

- **Minutes per Question (or Questions per Minute)**
  - Researched national comparisons (e.g., licensure exams)
  - We chose **1.45** minutes per question (average time across the test)

- **Question Count**
  - 93 questions for SCOPE 1 (80 scored + 13 unscored pilot questions)
  - 1.45 MPQ x 93 Qs = **135** minutes (2 hours and 15 minutes)

- **On Campus**
  - In-person (on campus) as a cohort; proctored
  - For **room reservations**, add startup time and shutdown time

Scoring | Weighting

- **Weighting**

Bloom's Taxonomy (Revised)		Item Difficulty		
		Mastered (P=>90%)	Moderate (P=70-90%)	Challenging (P=<70%)
Base-level (Recollection)	[1] Remembering or [2] Understanding	1 point	2 points	3 points
Mid-level (Application)	[3] Applying or [4] Analyzing	2 points	4 points	6 points
High-level (Evaluation)	[5] Evaluating or [6] Creating	3 points	6 points	9 points

Scoring | Distribution

- **Distribution for SCOPE 1**

Bloom's	100%	80 Qs	Item Difficulty		
			Mastered (~__%)	Moderate (~__%)	Challenging (~__%)
Base-level	%	#	% [# Qs]	% [# Qs]	% [# Qs]
Mid-level	%	#	% [# Qs]	% [# Qs]	% [# Qs]
High-level	%	#	% [# Qs]	% [# Qs]	% [# Qs]

Scoring | Scaled Points

■ **Scaled Points:** Distribution x Weighting

	Mastered	Moderate	Challenging	Total
SCOPE 1 (2022)	# Qs x 1 pt. = # pts	# Qs x 2 pts = # pts	# Qs x 3 pts = # pts	# scaled pts
	# Qs x 2 pts = # pts	# Qs x 4 pts = # pts	# Qs x 6 pts = # pts	# scaled pts
	# Qs x 3 pts = # pts	# Qs x 6 pts = # pts	# Qs x 9 pts = # pts	# scaled pts
	# scaled points	# scaled points	# scaled points	**248** scaled pts

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- **Performance Levels** – based on % of points obtained

  Level 4 [High] Will be recognized

  Level 3

  Level 2

  Level 1 [Low] Must meet with their advisor or the Office of Academic Affairs

Validity and Reliability Criteria

- **Content Validity**
  - Face validity: Experts are asked their opinion about whether the test measures the concept intended

- **Construct Validity**
  - Homogeneity: Test measures one construct
  - Convergence: Test measures concepts similar other instruments

How accurately are the concepts measured?

- **Criterion Validity**
  - Convergent validity: Test is highly correlated with tests measuring similar variables
  - Predictive validity: Test should have high correlations with future criterions

- **Homogeneity (or internal consistency)**
  - Item-to-total correlation: Point biserial index for individual questions
  - Kuder-Richardson coef. (KR-20):   Calculated/provided by ExamSoft
  - Item difficulty: Compare to original course results

How accurate is the test?

Development

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- Extensive ExamSoft category tagging system & requirements needed in advance
- ExamSoft Enterprise allows filtering based on tagged categories, when/if the question was last used, performance statistics, etc.

- Workgroup convened over the summer
  - Finalized SCOPE 1 competency blueprint
  - Extracted question bank items which were tagged for those competencies.
  - The workgroup chose questions/items based on the items' tagged
    - competency,
    - difficulty level, and
    - overall statistical quality.
  - To deter student memorization of course exam questions, the workgroup made minor changes to the questions and created a test bank for the annual exam.

- Beginning with new curriculum

- **SCOPE 1:** August of 2nd year
  - 1st year content

- **SCOPE 2:** August of 1st year
  - Mostly 2nd year content

- **SCOPE 3:** Early spring of 3rd year (students start rotations in mid-spring)
  - Comprehensive from all three years

ANALYSIS

Analysis

- **Master Blueprint**
  - 4 domains and 15 competencies.
  - 6 competencies included on SCOPE 1
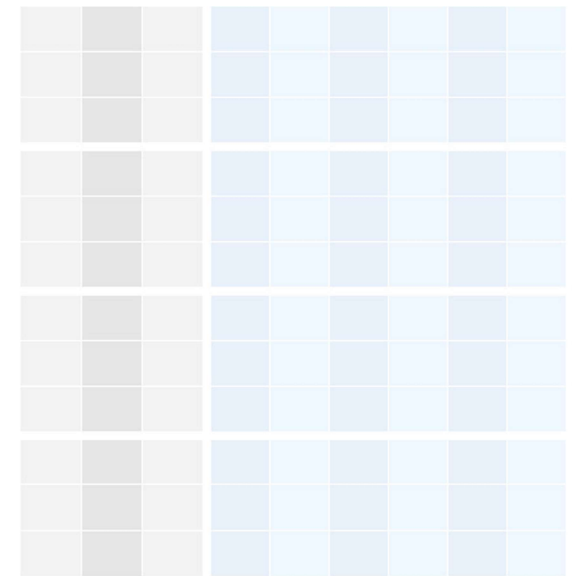 - Breakdown of competency performance (% & level)

- **Performance Levels (revised)**

Level 4

Level 3

Level 2

Level 1

Analysis, cont'd

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- **Other**
  - Passed all **validity and reliability** metrics, although test may be too hard
  - Can see how students performed on different **Bloom's** levels
  - Can analyze difference between original performance (course exams) & SCOPE 1 – determine level of **knowledge retention** on different competencies

- **Custom Student Reports**
  - % of questions correct
  - % of points correct
  - Performance level (based on scaled score)
  - Percentile w/in cohort
  - # of questions asked on each competency
  - % correct within each competency
  - Mean % correct of the cohort on each competency

ARGUMENTATION

Discussion

- **Future exams**
  - SCOPE 1 iteration 2
  - SCOPE 2 and 3
  - # of Qs decided and draft blueprints are created
  - Portion of Qs will carryover from prior years to test recall on prior competencies.

- **Stakes**
  - Increasing level each year and each iteration
  - Personal awareness / advising meetings and remediation / academic delays
  - Third iteration of SCOPE 3 is tentatively planned as high stakes

- **Benefits**
  - Ideal timing – The future of the national pharmacy curriculum exam (PCOA) is TBD

CONCLUSIONS

Conclusions

- Careful attention to each step and think ahead

- Background research on similar exams and reliability criteria

- Faculty involvement and approval

- Use for student advising and course reviews

- Competency data for individual and cohort performance

POTENTIAL IMPACT

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- Will help to identify strengths and weaknesses of the new curriculum – enables **data-driven decisions** about curricular modifications

- Will maintain compliance for the **accreditation** standards on assessment

- Will increase student **preparation** for licensure (or similar) examinations

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Thank You!

Elizabeth A. Sheaffer, MBA, PhD

Associate Dean for Assessment and Accreditation
Samford University McWhorter School of Pharmacy
Birmingham, Alabama

esheaffe@samford.edu

205-726-2896

Samford
University

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