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ASSESSMENT SOLUTIONS

Preparing Students to Pass Professional Certification and Licensure Exams

Professional certification and licensure classes are a journey with a defined and specific goal: preparing students to pass the exam at the end. But it's not about merely "teaching to the test." A robust certification and licensure class makes sure the crucial concepts in the exam are instantiated by students so that passing the exam reflects a true measure of student proficiency.

To do that effectively, you need to identify exactly where students are struggling—exactly what skills and knowledge they have, and exactly what skills and knowledge need more work. In addition to the certification practice exams, you need interim measures that help you refine instruction and improve student performance, ensuring student candidates have internalized the material and are prepared to pass.

Ask yourself:
- "How do I know if my exams are valid and reliable?"
- "How do I improve my exam statistics?"
- "I don't have the bandwidth to develop enough content"
- "How do I know if my assessment is effective?"

The answer is to follow a plan. Your plan may be large, supporting many tests for a large number of students, or it may be more modest, focusing on a more tightly focused exam. Regardless, a robust and standardized plan will help ensure you get the outcome you want.

This article focuses on the first two slices of the cycle to the right-hand side of the page: Design & Blueprint and Item Development & Review.

Assessment Blueprints

To do this, you must start with a primary objective and create an assessment plan that drives toward that primary objective. Regardless of the program, the underlying foundation of your objective should be that students know the material so well that passing the exam becomes almost incidental. An assessment plan provides a strong foundation to measure where students are, plus supports your program curriculum with a scaffold of learning that ensures they receive the instruction they need.

The next step is to identify your assessment development team[1]:

- Content Subject Matter Experts (SMEs):
    - Item writers
    - Item editors
    - Item reviewers
- Content SMEs and Assessment SMEs:
    - Test Creators
    - Test Reviewers
- Psychometric SMEs, such as statistical reviewers

Begin with a planning meeting to develop a test development plan. Having a plan for test development is like having a plan for a potluck family dinner. If you don't plan your family dinner well, you may end up with too many fruits and vegetables and too few protein dishes, or vice versa. You could end up with dishes that just don't go well together. Or you might not have anything for Cousin Jack who's on a paleo diet or your niece's new vegetarian boyfriend.

The same can happen with assessments. Without a plan, you could end up with too many items of only one difficulty level or focused on too narrow of a set of information. With a plan, you have a balanced approach that delivers high reliability, an effective appearance, and strong productivity.

The first step in the plan is to closely examine the professional certification standards in question to identify measurable skills and requirements. See our related article "Accreditation Like a Boss: Pro Tips for Connecting Accreditation and Assessment." Although that article's samples focus more on deconstructing university accreditation requirements, the principles are the same.

Cognitive Complexity in Item Maps

Your items need to fit into your plan like the pieces of a puzzle. Each item should measure a specific skill, and you should consider including multiple difficulty and cognitive complexity levels for each concept. Once you have an overall exam blueprint, the next step in an effective assessment plan is to map your proposed items to the plan, paying careful attention to a balance of cognitive complexity.

There are a variety of approaches and theories supporting cognitive complexity, and we discuss two of them below:

- Bloom's Revised Taxonomy
- Webb's Depth of Knowledge

Both of these methodologies cover much of the same ground conceptually, but structurally they approach the process quite differently.

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[1] Not sure you have the staff for all of these roles? Don't worry, Scantron can help. See "How Can Scantron Help?" at the end of this article for details.

Bloom's Revised Taxonomy[2]

Benjamin Bloom's learning framework has been used to help improve student learning and assessment since the 1950s. It consists of several conceptual hierarchies; the one that concerns us here is his *cognitive domain*. In its current revised taxonomy structure, this framework breaks the learning process into six segments:

This is Bloom's Level…	Measures this…	With questions that look like this…
L1: Remembering	Recall of facts, terms, dates, concepts, etc.	• Who is…? • What is…? • Select… • When did…?
L2: Comprehending	Demonstration of facts and ideas, shown by organizing, comparing, etc.	• How would you classify…? • How would you compare…? • What is the main idea of…?
L3: Applying	Use of knowledge to solve problems in new situations.	• How would you use…? • In situation X, how would you…? • Provide an example of…
L4: Analyzing	Use of knowledge to break information into parts, make inferences, etc.	• What are the parts of…? • Why do you think…? • What evidence can you find about…? • What is the relationship between…?
L5: Evaluating	Use of knowledge to make judgments about information, defend opinions, etc.	• What is your opinion of…? • What would you recommend if…? • How would you justify…?
L6: Creating	Use of knowledge to develop a new solution or propose alternatives.	• How would you solve…? • Propose and defend an alternative to… • Design a method for…

Use this chart to help you create items at differing levels of Bloom's complexity. Consider creating multiple items at the same level of complexity so that you can vary test content over time without changing the overall reliability of the test. Remember to keep a balance of complexity for each concept; although, some items will be better assessed through some levels than others.

Webb's Depth of Knowledge[3]

Norman Webb's Depth of Knowledge framework, when used to structure assessments, provides a scaffolding approach that helps instructors narrow down what is causing a student to struggle. As applied to assessments, the concept is straightforward: students who are struggling at later levels, such as DOK 3 or 4, may be struggling

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[2] An exhaustive discussion of Bloom's taxonomy is beyond the scope of this article. See http://www.bloomstaxonomy.org/ for more details and useful resources.

[3] See http://www.webbalign.org/ for more details.

because they have not attained the previous levels; therefore, they may be struggling to apply those basics effectively in more complex situations.

The following definitions are generalizations of the levels, but are sufficient definitions for the purposes of this article:

- **DOK 1:** Recall or recognize a fact or property. Use a known formula. Perform a routine calculation that is specifically requested.
- **DOK 2:** Explain a relationship between properties, functions, or variables. Select an operation from a scenario and perform it. Organize, represent, or interpret data. Present information in a different format; for example, write an equation from a graph.
- **DOK 3:** Generate a rule or formulate conclusions from data. Analyze thinking or work of another student. Justify processes or strategies.
- **DOK 4:** Apply concepts learned previously to longer-term assignments. Use complex reasoning, planning, developing, and thinking to complete the assignment.

The implications for assessment are also fairly clear. Including a balance of items geared toward the various DOK levels can help you identify more clearly where students may need additional study or assistance. For example, if you can see that a student has not yet fully internalized the names of the body's muscles (a DOK 1 concept), asking them to diagnose a specific muscle strain based on a list of symptoms (a DOK 3 item) may be beyond them. Rather than assuming they're just bad at diagnosis, you can correct the underlying issues by having them drill on the muscle groups until they do know them.

DOK Levels 1–3 can be easily assessed using either of the following:

- Traditional item types such as:
    - Multiple choice
    - Multiple response (aka choose all that apply)
    - True/False
    - Matching
    - Short response (aka fill in the blank)
    - Extended response (aka essay)
- Technology-enhanced item types (TEIs) that require the use of a computer or mobile device to support interaction, such as:
    - Dragging labels onto a diagram
    - Exploring a short segment of MRI footage to answer questions
    - Coloring segments in a diagram
    - Enlarging images to see more detail to answer questions

The common element for DOK Levels 1–3 is that those levels lend themselves well to measuring one concept or standard or skill at a time. You can focus exam items tightly, giving you greater reliability plus concrete and specific insight into student learning outcomes.

Note that DOK 4 assignments are typically not part of an assessment plan. DOK 4 requires longer-term thinking and planning and is typically best assessed using a performance-based assessment (PBA). Unlike traditional test items, PBAs typically measure several different skills at once. They are given over time and broken into multiple segments, each of which receives its own score. Certainly, you can roll up these segment scores into an overall score and apply that score to a final grade, but you typically would not write exam items for DOK 4 into regular assessments, given the time requirement.

Including a range of DOK levels in your exams helps you identify these issues well before the all-important certification exam. As you plan your assessments, consider how you want to balance DOK levels. For example, you may want far more DOK 1 and 2 items in tests given early in the program, with just a few as knowledge checks in tests given later in the program. Those later tests could focus more on DOK 3 items to demonstrate knowledge progression, while an ongoing DOK 4 PBA could serve to demonstrate that a student has synthesized foundational facts so that they can be applied to a real-world scenario that requires original thinking.

Developing Items

This article does not cover how to develop items. See our related article ["Accreditation Like a Boss: Pro Tips for Connecting Accreditation and Assessment."](#) Again, while that article's examples revolve more around designing exams to support university accreditation, the underlying principles of item development are the same.

How Can Scantron Help?

Scantron is a long-time leader in assessment solutions and services. We've served the education market from kindergarten to professional career development for more than 40 years. Our assessment solutions provide a broad range of support for higher education.

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Need help developing assessments and analyzing results? Regardless of how you want to access your exams, Scantron's team of assessment development and psychometric experts stand ready to assist you with any or all of the assessment development process. Looking back to the list of team members earlier in this article, we can supply

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Assessment Planning Questionnaire

Assessment Parameter Sample Questions

☐ How many assessments will be developed in Phase One/Year One?

☐ Will existing blueprints be used *(please list)* or do they need to be developed *(list any new needs)*?

☐ Do you have current items that you would like to use as model assessment items for item development?

☐ How should items be divided across DOK levels?

Item Development & Review Sample Questions

☐ Who, within your department, school, or team, will make decisions regarding the assessment design process?

☐ Who will create a timeline and/or schedule for development milestones and test development workflow?

☐ What milestones do you need and what will the test development workflow be?

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