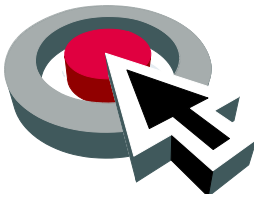

CETE Updated Expertise Brief 2019:

Verification of Occupation/Job/Practice Analysis: What/Why/How?

James Austin, PhD, & Brooke Parker, MS

Center on Education and Training for Employment
1900 Kenny Road, Columbus, OH 43210

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James Austin, PhD
Brooke Parker, MS

Purpose

Analyzing occupations, jobs, professional practice, and tasks aids in the development of work and worker requirements for multiple purposes (Brannick, Levine, & Morgeson, 2007). Among them are testing, job design, and training/curriculum development. A prominent use in credentialing is to serve as the basis for a "certification scheme. Theories and techniques for conducting occupational analyses are rooted in education, psychology, engineering, and human resource management (Wilson, Bennett, Gibson, & Alliger, 2012). This expertise brief is organized around a "What, Why, How" of verification — beginning when a panel or a committee defines (or revises) the elements of the content domain. Tasks are common elements, but broader sets of elements can be verified. A linear-cyclic process with a focus on verification is shown below, but variations are possible and not unusual.

Define Job/Occupation → Verify → Use Job/Occupation Information → Revise/Re-verify ……

WHAT is verification?

Verification is a check on an initial/updated definition (job/occupational definition), and accomplished by asking others to review-rate element by element. The process can be completed qualitatively, quantitatively, or in hybrid. Verification is best practice for quality assurance or due diligence in high-stakes testing-training contexts because it provides evidence for content-oriented validity. In lower stakes situations, verification supports quality but may not be as important for defensibility.

WHY conduct verification?

One answer to **WHY** resides in quality assurance. Whether using inductive or deductive job/occupational analysis, quality is critical. Further, data resulting from verification is used for training or testing specifications. A third motivation is to provide broader opportunities for input (voice) from members of a profession or occupation. Finally, if challenges are expected a verification supports legal defensibility.

Consider, for example, a facilitated technique called DACUM (Developing A CurriculUM; Norton & Moser, 2014). DACUM workshops, facilitated with a panel of 10-12 job experts, result in a chart containing broad duties, subordinate tasks, and other elements (e.g., knowledge areas, skills, acronyms, trends/concerns). Below we describe a standard CETE process for verification that can be applied widely to any occupation or job. We have used verification as a standalone as well as with DACUM, the Western Region Intergovernmental Personnel Assessment Council (www.wripac.org), Work Profiling System (CEB-SHL: www.ceb.shl.com/us), and Occupational Information Network (O*Net: www.onetcenter.org). What is done follows a customizable sequence in CETE projects. Broadly, immediately following the creation or revision of the occupational content a verification process unfolds from initial review to summary report.

HOW is verification conducted?

First, the newly-created or updated DACUM chart is shared with the client (e.g., firm, educational institution, or association). With client approval and signoff, the chart is designated as initial, or changes are incorporated, and then signoff occurs. Reviews typically include expert workers who served on a DACUM panel but may also include supervisors, union representatives, and human resources or training staff. Educational institutions include local education agencies, post-secondary institutions, and state or national education agencies. This quality assurance step can be expanded based on the proposed consequences of usage with higher stakes requiring more diligence than lower stakes (layers of review or documentation). A certificate program, for example, developed under the ICE 1100 or ASTM-2659E standard should pay special attention to this analysis phase of an ADDIE or SAM process.

Second, CETE staff recommends that verification always precede a handoff to task analyses, training/curriculum development, or testing. Requirements analysis ensures understanding about the project. Client organizations indicate goals of the verification (e.g., planned uses, purposes) and CETE

staff tries to ensure a match of expectations or recommends alternatives. Collaboration, negotiation, and project management principles help in guiding the rest of the verification project/phase to successful completion.

Approaches to verification may be qualitative or quantitative. Qualitative approaches to verification might include a focus group review of the occupational specification. CETE staff have used "parallel panels" in which two or more panels conduct the same DACUM process and the resulting charts are consolidated (either qualitatively or quantitatively). This process was used to create the Community Support Skill Standards in a National Skill Standards Board project during the 1990s. In fact, most funded projects of 22 sponsored by federal Departments of Labor or of Education, used DACUM to establish a body of practice/knowledge. Further, the National Skills Standards Assessment Collaborative (NSSAC, 1998) produced eight cross-industry competencies by synthesizing skill standards from healthcare, electronics, retail, and human services sector projects.

Quantitative verification, which we prefer, involves surveys (print or online) to "look over the shoulder" of the panel as well as ratings on occupational definition elements for high-quality, defensible materials and products. CETE has used print and optically-scanned surveys in past projects; currently our concentration is on web-based surveys. An ideal process (synthesized from experiences across CETE projects) might proceed as follows:

- Enter work duties and tasks, at a minimum, into a spreadsheet or database for manipulation — we advocate entering all elements including worker characteristics (e.g., knowledge, skills).
- Request demographic-experience information to describe the sample of respondents and allow filtered analysis.
- Use any job elements as "items" of the survey; it is appropriate to rate tasks, knowledge-skill statements, or other features of the chart or to employ a supplemental set (such as O*NET). If desirable, include repeated or impossible tasks/elements as a response-check for inattentive subject matter experts (SMEs), who would then be held out from analysis.
- Choose dimensions for rating (e.g., task, knowledge, or skill) carefully; we advise no more than three because each dimension adds ratings equal to the number of elements — the most we have used is four.

There are multiple options for verification survey rating. A classic pair is importance and frequency, but difficulty (learning and instructing) and needed at the time of testing or hire are often seen. A key is what you want to know. For example, one client wanted to know how to sequence training, so we asked incumbents to rate against the stem "By when do you need to be able to perform skillfully (or to know) X?" and rating anchors were temporally based. Excellent summaries of rating dimensions are available in articles on practice analysis by Raymond (2001, 2005, 2015). A rating for knowledge area, skill (KS) elements with 4 levels and verbal anchors is given below.

EXAMPLE: NECESSITY FOR PERFORMANCE SCALE (statements of knowledge area or skill) – degree respondents believe a KSA is necessary for successful performance of task.

<u>Scale Values – Definitions for Necessity for Performance (for each task)</u>
0 – Possession of KSA is NOT RELATED [to successful overall performance].
1 – Possession of KSA is DESIRABLE but NOT essential [to successful …].
2 – Possession of KSA is IMPORTANT [to successful …].
3 – Possession of KSA is ESSENTIAL [to successful …].

Sample sizes recommended by CETE depend on the purposes of the client and the size of the target population. Generally, higher stakes tests for hiring or certification require a higher response rate (percentage of population responding) and several hundred respondents, while lower stakes uses require less in terms of response rate and thus 50–100 respondents may be sufficient. Incentives, in our experience, are very helpful in increasing response rates as is creating shorter "incomplete" surveys with common items through matrix sampling (Childs & Jaciw, 2003).

CETE posts a draft, seeks approval from client staff, and then monitors online surveys for periods from two to six weeks. Incentives and reminders are helpful in boosting response rates. Data analysis consists of cleaning, calculation of composite variables (e.g., criticality, duty level values), and statistics (descriptive, exploratory, or inferential). As well, subgroup or filtered analyses can reveal additional details (e.g., comparing samples of more and less experienced respondents, incumbents, and supervisors, or certified versus noncertified respondents). Lastly, decisions about testing emphasis or training weight are made about tasks, KSA, and composites using rational cutoffs and decision trees. Below is a calculation of criticality for two respondents when there are three ratings for each task element: importance, frequency, and needed at time of testing.

Person	Need at Testing (0=No, 1=Yes)	Impt (1-5)	Freq (1-5)	Crit
Person 15	**1 (Yes)**	**5 (Critically Imp)**	**5 (Daily)**	**25**
Person 20	**0 (No)**	**4 (Very Imp)**	**3 (Monthly)**	**0**

Third, after data cleaning and analysis, the important and frequent tasks are specified and the quantitative data is uploaded to the database defined

above, which contains duties, tasks, and possibly other elements. There, calculated statistics and composites are available for:

- creating a test specification (blueprint) using a spreadsheet or deeper analysis (e.g., item response theory)
- conducting follow-up task analyses (behavioral or cognitive) to drill down
- assessing training needs, planning training programs, or evaluating training outcomes
- assessing employee competency for certification, hiring, or promotion
- developing new competency-based materials designed to meet training needs (online, SCORM])

A final step, for thoroughness and documentation, involves a write-up of the project. This step does not have to result in a long document but is part of documenting the work for a possible technical report and may be a project deliverable. Additional information is found in certification accreditation guidelines (NCCA, 2016); a template for the sections of such reports is:

1. purpose (certification, selection, curriculum development)
2. verification method
3. focus group or survey respondents (initial committee & survey)
4. analyses (composites, descriptive-exploratory, inferential, Rasch)
5. results (by task/knowledge/skill, aggregated, & filtered)
6. conclusions (is domain of practice or BoK established?)

Selected investigation-research needs specific to task verification include:

1. Applying verification to replication data.
2. Consolidating when >1 panel is used on the same occupation or job.
3. Using verification data to establish new areas for curriculum, testing, or credentialing; tie-in to competency models (DoL clearinghouse).
4. Integrating verification into online methodologies such as SkillsNET.
5. Analyzing alignment (crosswalk) data in a deeper and richer manner.
6. Using behavioral and cognitive task analysis to follow up verification.
7. Evaluating-implementing relevant recommendations from a recent National Research Council review of O*Net (Tippins & Hilton, 2010).

In summary, we have reviewed one part of a competent job-occupational analysis: verification of selected elements of the content domain. We used a framework of what, why, and how. CETE staff strongly recommends verification of job-occupational analysis for quality assurance, defensibility, and input-voice from practitioners. Fit-for-purpose certification schemes rely on proper personnel, processes, and documentation.

Selected Bibliography

[A more comprehensive set is available from CETE via email request to austin.38@osu.edu.]

Brannick, M. T., Levine, E. L., & Morgeson, F. P. (2007). *Job and work analysis* (2nd ed.). Thousand Oaks, CA: Sage.

Childs, R. A., & Jaciw, A. P. (2003). Matrix sampling of items in large-scale assessments. *Practical Assessment, Research & Evaluation*, 8(16). Retrieved 7-3-13 http://PAREonline.net/getvn.asp?v=8&n=16

Chinn, R., & Hertz, N. (2010). *Job analysis: A guide for credentialing organizations* (Resource Brief), Lexington, KY: Council on Licensure, Enforcement, and Regulation.

Flanagan, J. (1954). Critical incident technique. *Psychological Bulletin, 51,* 327–358.

Lane, S., Raymond, M., & Haladyna, T. (Eds.). (2015). *Handbook of test development* (2nd ed.). New York: Routledge.

Martini, J. C. (2006, August). *Identification and verification of the job duties and tasks for the occupation of power engineer.* Unpublished Dissertation, Greenleaf University.

National Skill Standards Assessment Collaborative. (1998, January). *Cross-industry assessment and certification.* San Francisco: WestED.

Norton, R. E., & Moser, J. (2014). *Developing a curriculum (DACUM) (*4th ed.). Columbus, OH: CETE.

Peterson, N. G., Mumford, M. D., Borman, W. C., Jeanneret, P. R., & Fleishman, E. A. (Eds.). (1999). *An occupational information system for the 21st century: The development of O*Net.* Washington, DC: American Psychological Association.

Raymond, M. R. (2001). Job analysis and the specification of content for licensure and certification examinations. *Applied Measurement in Education, 14,* 369–415.

Raymond, M. R. (2005). An NCME instructional module on developing and administering practice analysis questionnaires. *Educational Measurement: Issues & Practice, 24,* 29–34.

Raymond, M. R. (2015). Job analysis, practice analysis, and the content of credentialing examinations. In S. Lane, M. R. Raymond, & T. Haladyna (Eds.), *Handbook of test development* (2nd ed., pp. 144–164). New York, NY: Routledge.

Tippins, N., & Hilton, M. L. (2010). *A database for a changing economy: Review of the Occupational Information Network (O*NET)*. Washington, DC: National Academies Press.

Wilson, M. A., Bennett, W., Jr., Gibson, S. A., & Alliger, G. M. (Eds.). (2012). *The handbook of work analysis: Methods, systems, applications and science of work measurement in organizations*. New York: Taylor & Francis.

VERIFICATION SURVEYS: RATING DIMENSIONS

1. POTENTIAL BACKGROUND and DEMOGRAPHIC VARIABLES
These provide ways to "filter" the data to accomplish your goals.

- unit, geographical location, length of time in current position
- experience level (time in similar positions, time since certification or recertification)
- education level, credentials (e.g., licenses, certifications held — entry, advanced)
- types of personnel or clients interacted with (possibly using predetermined categories)
- types of issues or problems addressed (predefined categories)
- standard demographics: gender, ethnicity, age (Use carefully, position wisely)

2. TASK RATINGS (Raymond, 2015 updates Raymond & Neustel, 2006)
Potential task ratings depend on uses of the verification data. Specialized purposes are indicated in brackets; generic without brackets. Because each added rating increases responses by the number of tasks rated, motivation and error can be affected.

- overall importance to the job usually with reference to job/role performance
- task frequency (How often do you perform this task?)
- task responsibility (whether or not responsible; same as "Do you perform … yes or no?")
- education, time of skill acquisition (where learned: school or practice)
- needed at job entry (yes or no) [personnel selection tests]
- needed at time of certification/licensure (yes or no) [credentialing test]
- average years of experience on the job to attain proficiency [maybe for certification]
- level of responsibility (assist with, perform under supervision, independently perform) [job evaluation]
- type of responsibility (recognize when to perform, perform, interpret, correct actions) [job evaluation]
- relative time spent (similar to task frequency, but statistically difficult)
- task complexity or difficulty [training, job evaluation]
- task learning difficulty [training]
- level of proficiency required to perform [training]
- consequences of deficient performance [certification, licensure, training]
- risk of deficient performance [certification, licensure, training]
- degree to which additional training is needed or desired [training needs assessment]
- extent to which I have the knowledge needed to perform the task [training needs assessment]
- level of confidence in performing the task [training needs assessment]

3. OTHER CHART ELEMENTS (TOOLS, WORKER BEHAVIORS, TRENDS)

DACUM charts include additional elements generated by panelists: General Knowledge-Skills; Worker Behaviors (better defined as Characteristics, Attitudes/Traits); Tools, Equipment, Supplies; and Trends, Concerns.

- If additional chart elements generated by the DACUM process are surveyed, we typically request ratings of importance of the element to the overall job and possibly where acquired.
- Approaches we have used in higher stakes cases:
    1. O*NET Knowledge Areas (33) and Skills (35) for standardization and comparison (broad brush, high level)
    2. Use fee-based SHL Work Profiling System® with Universal Competency Model® or Korn-Ferry "Leadership Architect"® [Both use card sorts to collect data]
    3. Augment standard DACUM model using focused brainstorm.
    4. Use task analysis (behavioral, cognitive) to follow up and generate detailed information.
- Finally, best practices call for linkage between KSA-KSJ (knowledge skill judgment) and tasks (assessing the link between each KSJ and all tasks), although it is time consuming and arduous.

4) POTENTIAL DIMENSIONS FOR RATING KSA-KSJ STATEMENTS

- frequency: How often do you apply or draw on this KSA in practice?
- time spent: How much time (relatively) do you spend using this KSA?
- importance: How important or relevant is mastery of this KSA to your practice of X?
- depth of knowledge: What level is required for this KSA in practice? (similar to O*NET ratings)
- acquisition: Where (and by when) did you learn to perform this KSA (training: day 1 on job)?
- linkage: To what extent is KSJ 'Y' essential for performance of task 'X' (0–1, or 0—1—2)?