


Independent Reviewer:


Bruce Little, Ph.D.


Date

Subject: Independent Review of the August 2012 California Acupuncture Licensing Examination (CALE) Investigation Findings Report

Introduction and Brief History of the Project

In January 2013, I was contacted by the Department of Consumer Affairs to provide an independent review of the August 2012 California Acupuncture Licensing Examination (CALE) Investigation Findings Report, conducted by Terri Thorfinnson, Executive Officer of the Acupuncture Board.

Following discussions between individuals at the Department of Consumer Affairs and the Commission on Teacher Credentialing (my current employer), a Standard Agreement commencing on January 24, 2013 (or upon approval) through March 23, 2013 between the two agencies was made to assign me to provide an independent review of the August 2012 California Acupuncture Licensing Examination (CALE) Investigation Findings Report.

To better understand the context under which Ms. Thorfinnson conducted her investigation, I met with Denise Brown, the Director of the Department of Consumer Affairs, and with Robert Holmgren, Ph.D., the Supervising Test Development Consultant for the OPES, who was assigned to assist me in securing information/data relevant to questions concerning the August 2012 CALE and to Ms. Thorfinnson's investigation findings.

According to the Executive Summary in Ms. Thorfinnson's August 2012 California Acupuncture Licensing Examination (CALE) Investigation Findings Report, concerns were expressed by attendees of the November 15, 2012 meeting of the California Acupuncture Board (Board). These concerns were related to the quality of the August 2012 CALE and the method that was used in setting the passing score (cut score). As a result of these concerns, the Board ordered Ms. Thorfinnson to conduct an investigation.

“...The investigation (i.e., Ms. Thorfinnson’s investigation) into the August 2012 CALE began with several key questions:

- 1) Was the exam validated and what does that mean?
- 2) Did the exam follow the exam plan set by the occupational analysis?
- 3) Is the item bank adequate and how was it impacted by the “compromised” questions?
- 4) Was there anything different about the exam development compared with past CALEs?
- 5) Was the exam reliable in predicting and ensuring minimum acceptable competence?
- 6) Was the cut score set correctly or should it be changed and why?”

The Independent Review

The Role of an Independent Reviewer

The role of an independent reviewer is to consider relevant information/evidence and make independent judgments about some products, processes, or events, based on relevant professional and legal references and guidelines, and on relevant professional training/experience, and expertise.

In this particular case, this independent reviewer was asked to evaluate the August 2012 California Acupuncture Licensing Examination (CALE) Investigation Findings Report, conducted by Ms. Thorfinnson and determine if this investigator’s review, based on the existing information/evidence relevant to the six key questions (listed above), would be substantially similar to or different from the three findings listed in Ms. Thorfinnson’s report. The unexpanded versions of the three findings listed in Ms. Thorfinnson’s report are displayed below for the readers’ convenience:

1. The August 2012 CALE was validated by OPES.
2. The August 2012 CALE is a reliable measure of minimum acceptable competence.
3. The passing score (cut score) was accurately set for the August 2012 CALE.

Preparation for the Independent Review

Inasmuch as this reviewer's judgments needed to be focused on information/evidence related to the original six key questions generated during the November 15, 2012 Board meeting and the three findings listed in Ms. Thorfinnson's report (dated February 19, 2013), I asked Dr. Holmgren for access to various CALE-related data and documents. I also arranged to interview one of the OPES Personnel Selection Consultants who had attended the passing score workshop for the August 2012 CALE.

Review of Data and Documents

Prior to reviewing any confidential examination-related documents, I signed an Examination Security Affidavit; this was witnessed by Director Denise Brown and Dr. Robert Holmgren. Due to the sensitive/confidential nature of many of the documents I reviewed, I chose to review these documents at the OPES office. These documents remained in secure storage when I was not reviewing them.

During the months of February and March, 2013, I reviewed a variety of CALE-related documents (e.g., memoranda, spreadsheets, data analysis printouts) at the OPES office. In addition to reviewing the August 2012 California Acupuncture Licensing Examination (CALE) Investigation Findings Report conducted by Ms. Thorfinnson, I also reviewed the December 2008 Acupuncturist Occupational Analysis, since occupational analyses provide the foundational validation evidence and examination outlines (also called blueprints or exam plans) from which occupational licensing exams should be developed.

In addition to reviewing CALE-related data and documents pertaining to the August 2012 CALE passing score workshop, I reviewed numerous CALE-related documents dating back to January 2005. These documents included the following:

- OPES/Acupuncture Board Workshop Summaries of item bank reclassification activities performed by SMEs and facilitated by OPES examination staff - this work is typically performed to check alignment of test items that exist in an item bank against the most current examination outlines (developed as part of the Occupational Analysis) and to reclassify all usable items according to the most recent corresponding tasks, knowledge statements, subareas, and content areas of an occupation.
- OPES/Acupuncture Board Workshop Summaries that described examination item-writing and item-review activities performed by Acupuncture Subject Matter Experts (SMEs) and facilitated by OPES examination staff - typically at least one Personnel Selection Consultant.
- OPES/Acupuncture Board Workshop Summaries of examination construction activities performed by SMEs and facilitated by OPES examination staff
- Relevant examination item analyses performed by OPES staff using IteMan Item Analysis Program - a software package developed specifically for analyzing test items (These analyses are conducted after test items [or test forms] have been administered to examinees.)
- OPES/Acupuncture Board Workshop Summaries of examination passing score (cut-score) setting activities performed by SMEs and facilitated by OPES examination staff
- Memoranda sent from OPES examinations staff to the California Acupuncture Board pertaining to the CALE

Independent Reviewer Findings

I will address, in the original order, the three findings found in the August 2012 California Acupuncture Licensing Examination (CALE) Investigation Findings Report, conducted by Ms. Thorfinnson. Ms. Thorfinnson's findings are numbered 1-3 below and following each of her stated findings are my listed comments, reviews of the relevant evidence, and my findings. (My finding numbers will match those of Ms. Thorfinnson.)

Ms. Thorfinnson's finding 1: The August 2012 CALE was validated by OPES.

Comments

While differences exist in the interpretation and use of the term "validated" as it pertains to job-related examinations, I will adhere to a commonly accepted measurement perspective that examinations are not "valid" per se, but if constructed well and according to professional guidelines, a high quality examination will, to a large degree, align to an examination outline (or blueprint) developed as part of an occupational analysis. In addition, a well-developed examination will provide sound evidence from which decisions concerning some level of candidate preparation might be made.

Review of the evidence (in preparation for finding 1)

At the request of the California Acupuncture Board (CAB), staff at the Department of Consumer Affairs' Office of Examination Resources (now called OPES) conducted a validation study of the Acupuncturist occupation in California. The study was completed in December 2008.

As part of the occupational analysis, OPES staff interviewed a number of California-licensed Acupuncturists (hereafter Acupuncturists) and met with focus groups comprised of Acupuncturists to identify the tasks that Acupuncturists perform on the job, and the knowledge required to perform those tasks.

Following these interviews and focus group meetings, OPES staff developed a questionnaire that was sent statewide to more than 3,900 Acupuncturists in good standing with CAB. The response rate for questionnaires used in the analysis was 553/3,918 or 14.11%. (Some questionnaires were excluded from the analysis because the recipients were no longer practicing or had returned blank questionnaires, as is common in these kinds of studies.)

The Acupuncturist questionnaire was made up of three sections. The first section asked Acupuncturists to provide demographic information about themselves, their work setting, and their practice. The second section asked Acupuncturists to rate specific job tasks (on provided rating scales) in terms of how frequently they performed the tasks and how important the task was to performance of their job. The third section asked Acupuncturists to rate specific knowledge statements on how important that knowledge was to performance of their job.

After the questionnaires were received by OPES and the data from the questionnaires were entered, OPES calculated critical values for each task and knowledge statement based on the ratings that questionnaire respondents provided, then met with another focus group of Acupuncturists who determined that all the task and knowledge statements would be retained for the examination outline (test blueprint). An additional focus group of Acupuncturists then established the links between the job tasks and the related knowledge statements for the examination outline. The examination outline was structured into five content areas weighted proportionally (based on ratings) relative to the other content areas. The examination outline specifies the job tasks and knowledge that a California Acupuncturist is expected to master at the time of licensure.

While high quality OAs and the resulting examination outlines do not guarantee that a high quality examination will be created, they provide critical content-related information to assist in the development of examinations that are job related.

Independent Reviewer's Finding 1

Inasmuch as a well-conducted and well-documented occupational analysis (OA) can provide a solid and legally defensible foundation for a high-quality examination program, it was important to review the 2008 Acupuncturist OA conducted by OPES staff.

Many, if not most, occupations evolve over time, and having noticed the 2008 date of the Acupuncturist OA, I initially wondered if this could be a concern. After performing a review of the CALE-related documents (e.g., workshop summaries), and interviewing OPES staff who had attended CALE-related workshops, I found no indication that any of the SMEs who had participated in CALE-related workshops might have considered any of the tasks or knowledge statements listed in the 2008 study to be out of date. (A number of these Acupuncturist SMEs had also participated in quite a few CALE-related item-review workshops over the past few years and, as such, had ample opportunities to voice any concerns.)

The participation of multiple Acupuncturist SME panels and the sample of California Acupuncturist survey respondents that OPES staff included when conducting the 2008 Acupuncturist OA appear to be sufficient to support the development of the examination outline for the Acupuncturist examination. The evidence provided in the 2008 Acupuncturist OA indicates that OPES staff members followed accepted professional guidelines in conducting the OA and in developing the examination outline used to construct the CALE.

The CALEs that have been assembled by Acupuncturist SMEs (under the guidance of OPES staff facilitators) since the 2008 Acupuncturist OA seem to align well with the examination outline that was developed during the 2008 OA. This is commonly one type of evidence considered when determining whether a test is valid for the stated purpose of the examination – in this case, to determine if examinees are prepared to work safely and effectively in California as entry-level Acupuncturists.

Ms. Thorfinnson's finding 2: The August 2012 CALE is a reliable measure of minimum acceptable competence.

Comments

While validity is appropriately considered the most critical component of any examination program, reliability provides an important supporting role. Examination programs that exhibit problems with reliability need to be evaluated to determine the reason.

Reliability is an indicator of how dependable a test is in measuring that which is intended to be measured. A test would be considered reliable if the same test takers were to receive similar scores on the test after having taken it a number of times. (Of course this assumes that no learning or remembering of the test items is occurring on the part of the examinees.)

It is important to note that just because a test is reliable, we should not necessarily assume that it is valid. I will use a brief analogy of the steering wheel in a car. If the wheels of the car are properly balanced and aligned, and the steering components are centered properly, we can drive a car on a level road, release our grip on the steering wheel and the car will continue in a more-or-less straight line. If we repeat this behavior a number of times with the same result, we can comfortably say that the steering is accurate (valid), in that the car does what we intended it to do, and we can say that the steering is reliable because it goes straight in a repeatable fashion. If we were to release the steering wheel and the car continuously veered to the right, we would assume that the steering was reliable (e.g., repeatable, even predictable), but it wasn't accurate (valid) because it wasn't behaving as intended (continuing in a straight line).

Before we determine if a test is reliable, we first need to have SMEs establish that the test items are aligned to the examination outline and that the items are written to a level appropriate for safe and effective entry-level practice. In addition, test items need to be evaluated using appropriate statistical measures. Test items can be considered reliable yet exhibit

variations in performance by administration. Examinee groups can change over time and examinee performance can also be affected in a number of ways. In terms of differences in group performance, first-time test takers tend to score better, on average, than repeat test takers. The primary reason is that repeat test takers are by definition a different group than those who passed the exam on the first attempt. The entire group of repeat test takers has already *not* passed the exam and was likely not as well prepared to take the exam as those who passed on the first attempt.

Review of the evidence (in preparation for finding 2)

In preparation to evaluate Ms. Thorfinnson's second finding, I reviewed the item- and test-level analyses of the CALE performed by OPES staff using Iteman Item Analysis Program - a software package developed specifically for analyzing test items (These analyses are conducted after test items (or test forms) have been administered to test candidates.) These analyses can provide considerable insight into the quality of the test items and test forms.

Independent Reviewer's Finding 2

A review of the item- and test-level statistics indicated that the CALE test items and test forms possess acceptable levels of performance. Test-level statistics indicate that the CALE test forms have had acceptable levels of performance as indicated by the commonly calculated statistics.

Ms. Thorfinnson's finding 3: The passing score (cut score) was accurately set for the August 2012 CALE.

Comments

Developing examinations and determining passing scores for subject areas in which the test developers are not specifically trained (e.g., Acupuncturist) has led test developers to rely heavily on the use of SMEs. While test developers who work with individuals in a particular occupational may gain considerable insight into an occupation, it is critical to use SMEs and current practitioners to ensure that test items are job related and aligned to the examination outline. Likewise it is critical to use SMEs to ensure that passing scores are set based on the expertise of SMEs and their understanding of what constitutes minimum acceptable competence for an entry-level licensee.

Note: It is difficult for test developers (or anyone else) to know precisely if a passing score is set accurately. Criterion-referenced passing scores depend very heavily on the SMEs' understanding of what constitutes minimum acceptable competence and their ability to apply that conceptualization of minimum acceptable competence to their ratings of the items on the test form.

Many if not all tests will pass some small number of examinees who should not have passed (false positives) and will not pass some number of examinees who should have passed (false negatives). This occurs for a number of reasons, such as:

- Testing conditions that are not conducive to good test taking (e.g., loud noises, excessive cold or heat, or other uncomfortable environmental conditions)
- Examinee anxiety level or illness
- Test items that are too easy or too difficult, or that contain wording that is unclear
- Examinee cheating

It is also difficult to compare passing rates by examination administration due to reasons, such as:

- True differences in examinee groups
- Revisions in test content (We often see this when a program revises its rules or regulations and not all examinees have had an opportunity to learn about the changes prior to testing.)
- Sample size differences (with small sample sizes being especially sensitive to score fluctuations)

Review of the evidence (in preparation for finding 3)

In preparation to evaluate to Ms. Thorfinnson's third finding, I reviewed the following documents/spreadsheets:

- OPES/Acupuncture Board Workshop Summaries of examination construction activities performed by SMEs and facilitated by OPES examination staff
- Relevant item analyses conducted by OPES staff
- OPES/Acupuncture Board Workshop Summaries of examination passing score (cut-score) setting activities performed by SMEs and facilitated by OPES examination staff
- A spreadsheet that contained the ratings that the Acupuncturist SMEs provided for the items contained in the test form that had been administered to the candidates during the August 2012 CALE

I also interviewed an OPES consultant who attended the passing-score workshop for the August 2012 CALE to discover if the consultant noticed anything unusual about how the workshop was conducted or in the ratings that the SMEs provided for the test items in the August 2012 CALE. According to the OPES consultant, the workshop was very routine.

A number of the Acupuncturist SMEs who had participated in the August 2012 CALE passing score workshop had participated in previous CALE-related workshops (e.g., item [question] writing, item review, and passing score). This practice of using SMEs on multiple occasions is not uncommon in the testing industry and is often done to add a sense of continuity to the process.

Independent Reviewer's Finding 3

According to the documents reviewed, there were eight California-licensed acupuncturist SMEs who participated in the August 2012 CALE passing-score workshop. This is an acceptable number of SMEs for this type of workshop.

OPES staff followed accepted professional procedures in conducting the passing score workshop for the August 2012 CALE. Conversations with an OPES consultant who attended the workshop indicated that the Acupuncturist SMEs who participated in the understood what constituted entry-level practice in Acupuncture and assigned reasonable ratings to the test items based on that conceptualization.

General conclusion

After reviewing all the available evidence, I find that OPES staff and the Acupuncturist SMEs involved in assisting OPES staff in examination development and in the setting of the passing score for the August 2012 CALE adhered to acceptable professional guidelines and procedures.