

# **PORTFOLIO EXAMINATION TO QUALIFY FOR CALIFORNIA DENTAL LICENSURE**

**SUBMITTED TO**

Dental Board of California  
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## EXECUTIVE SUMMARY

This report describes the procedures used by psychometric consultants at Comira to define the competencies to be tested in the portfolio examination and provide background research that may affect the implementation process. Because the portfolio is an examination, it must meet the Standards for Educational and Psychological Testing (1999) to ensure that it is fair, unbiased, and legally defensible. The purpose of applying the Standards to the validation process is to ensure that the portfolio examination can provide evidence that entry-level dentists possess the minimum competencies necessary to protect public health and safety.

The most important step in establishing the validity of the portfolio examination is to define the competencies to be tested in the examination. Separate focus groups of key faculty from five Board-approved dental schools were convened to identify for oral diagnosis and treatment planning, direct and indirect restoration, removable prosthodontics, endodontics, and periodontics. Basically, focus group participants identified the competencies to be assessed in a systematic way beginning with an outline of major competency domains and ending with a detailed account of major and specific competencies organized in outline fashion. All participants provided input in a systematic, iterative fashion, until consensus is achieved. The competencies identified from this process will serve as the framework for the evaluation system, training and calibration procedures for examiners, and audit procedures for evaluating the efficacy of the process.

- Section 5 lists the major competencies and the subcomponents within each competency (to include in statute)
- Section 6 describes the specific content to be covered within each subcomponent (to be included in regulation upon implementation)
- Section 7 describes basis for the evaluation system and procedures required to design it (to be included in regulation upon implementation)
- Section 8 describes the procedures that will be used to train and calibrate examiners (to be included in regulation upon implementation)
- Section 9 describes procedures that will be used to establish audit procedures for ensuring that the examination accomplishes its objectives (to be included in regulation upon implementation)

The foundation of the portfolio examination is already in place at the dental schools. All five dental schools---University of Pacific, University of California San Francisco, Loma Linda, University of Southern California, and University of California Los Angeles---had a great deal of consistency in their evaluation system. They used very similar criteria to evaluate students' performance and used similar procedures to calibrate their faculty

according to performance criteria. This finding has important implications for the implementation phase of the portfolio examination because the evaluation systems currently used by the dental schools will not require major changes. The only difference between the current systems and the portfolio examination is that the competencies and the system to evaluate them would be standardized across schools. Therefore, the portfolio examination process can be implemented within the dental schools without additional resources. It is anticipated that the students will find the portfolio examination as a reasonable alternative for initial licensure.

In summary, the dental schools were able to reach consensus in identifying critical competencies to be measured in the portfolio examination, thereby standardizing the competencies to be measured and providing the framework for the evaluation system, training and calibration procedures for examiners, and audit procedures for evaluating the efficacy of the process. Active involvement from the five current dental schools will be required to standardize the evaluation system, calibrate examiners, and establish protocols for auditing the examination. Since the foundation of the evaluation system and calibration processes is already embedded in the curriculum, no additional resources will be required.

## TABLE OF CONTENTS

SECTION 1 – INTRODUCTION.....	1
OVERVIEW .....	1
UTILIZATION OF EXPERTS .....	1
PSYCHOMETRIC STANDARDS.....	2
SECTION 2 – BACKGROUND .....	3
EXISTING PATHWAYS.....	3
PORTFOLIO EXAMINATION PATHWAY.....	3
REQUIREMENTS FOR PORTFOLIO EXAMINATION .....	4
OTHER REQUIREMENTS .....	4
SECTION 3 –THE PORTFOLIO EXAMINATION MODEL.....	5
DEFINITION .....	5
CHARACTERISTICS.....	5
UNIQUE FEATURES.....	6
SECTION 4 – CONTENT VALIDATION .....	9
APPLICABLE STANDARDS.....	9
METHODOLOGY .....	10
PROCESS.....	10
PROCEDURE.....	11
SECTION 5 – JOB-RELATED CONTENT OF PORTFOLIO .....	12
SECTION 6 – ANNOTATED OUTLINE OF COMPETENCIES.....	13
AREA 1: COMPREHENSIVE ORAL DIAGNOSIS AND TREATMENT PLANNING ..	13
AREA 2: DIRECT RESTORATION.....	15
AREA 3: INDIRECT RESTORATION .....	17
AREA 4: REMOVABLE PROSTHODONTICS .....	18
AREA 5: ENDODONTICS .....	20
AREA 6: PERIODONTICS.....	22
SECTION 7 – EVALUATION SYSTEM.....	23
APPLICABLE STANDARDS.....	23
BEHAVIORALLY ANCHORED RATING SCALES .....	24
MINIMUM COMPETENCE .....	24
SECTION 8 – EXAMINER TRAINING AND CALIBRATION.....	26
APPLICABLE STANDARDS.....	26
EXAMINER SELECTION CRITERIA .....	26
PROCESS.....	27
TYPES OF RATING ERRORS .....	27

CROSS-TRAINING OF EXAMINERS.....	28
SECTION 9 – AUDIT PROCESS.....	29
APPLICABLE STANDARDS.....	29
PROCESS.....	29
ROLE OF AUDITORS .....	30
DOCUMENTATION FOR VALIDITY EVIDENCE .....	30
SECTION 10 – RESEARCH FINDINGS .....	32
PSYCHOMETRIC ISSUES.....	32
INITIAL LICENSURE REQUIREMENTS IN OTHER JURISDICTIONS.....	33
COMPARISON OF REQUIREMENTS IN THE U.S. AND CANADA .....	36
EXISTING COMPETENCY EXAMINATIONS.....	37
CALIBRATION OF EXAMINERS.....	42
SECTION 11 - REFERENCES .....	44

## LIST OF TABLES

Table 1 – Major competencies and subcomponents.....	12
Table 2 – Non-inclusive examples of quality evaluation criteria for casting preparations.....	25
Table 3 – Content-specific documentation.....	31
Table 4 – Summary of existing requirements for initial licensure.....	34
Table 5 – Comparison of practices in U. S. and Canada for initial licensure.....	37
Table 6 – Competency examinations: Loma Linda University.....	38
Table 7 – Competency examinations: University of California Los Angeles.....	39
Table 8 – Competency examinations: University of California San Francisco.....	40
Table 9 – Competency examinations: University of the Pacific.....	41
Table 10 – Competency examinations: University of Southern California.....	42

## LIST OF APPENDICES

APPENDIX A – CONSULTANT BACKGROUND.....	46
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## **SECTION 1 – INTRODUCTION**

### **OVERVIEW**

Comira approached the portfolio examination with the understanding that the outcome would directly impact predoctoral dental education at every dental school in California and could provide the framework for evaluating predoctoral dental competencies in dental schools across the nation.

The overarching principle for development of the portfolio examination pathway was consumer protection. Comira worked closely with dental school faculty to derive the framework and content of the examination; moreover, procedures were conducted in an objective and impartial manner with the public's health, safety, and welfare as the most important concern.

First, Comira met with deans and dental school faculty who represented major domains of practice as well as legislative sponsors from the California Dental Association to present the portfolio examination concept and answer faculty questions regarding impact on their respective programs. Second, we conducted focus groups with representative faculty from each of the Board-approved dental schools to individually present the concept and discuss their concerns. Third, we conducted discipline-specific focus groups, i.e., comprehensive oral diagnosis and treatment planning, direct and indirect restoration, removable prosthodontics, endodontics, and periodontics, to develop the content for the examination.

From these meetings, we gained an understanding of the predoctoral dental competencies that were critical to development of the portfolio examination and creating supporting documentation that would be used in the formulation of Assembly Bill 1524. We also conducted an extensive review of written documentation of each school's competency examinations to gain insights into the procedures used in competency examinations and associated scoring systems.

### **UTILIZATION OF EXPERTS**

Deans, section chairs, department chairs and/or other faculty who were knowledgeable in the content domains of interest, e.g., comprehensive oral diagnosis and treatment planning, direct and indirect restoration, removable prosthodontics, periodontics, endodontics, were consulted throughout the process to provide expertise regarding the competencies acquired in their respective programs and the competencies that should be assessed in the examination. Focus groups were conducted face-to-face or via videoconference link between conference rooms at the University of the Pacific and at the University of Southern California.

## PSYCHOMETRIC STANDARDS

The Standards for Educational and Psychological Testing (1999) set forth by the American Educational Research Association, the American Psychological Association, and the National Council on Measurement in Education serve as the standards for evaluating all aspects of credentialing, including professional and occupational credentialing. The Standards are used by the measurement profession as the psychometric standards for validating all examinations, including licensing and certification examinations.

Whenever applicable, specific Standards will be cited as they apply to definition of examination content, rating scales, calibration of raters, and auditing procedures to link the particulars of the portfolio examination to psychometric practice.

## SECTION 2 – BACKGROUND

### EXISTING PATHWAYS

The Dental Board of California (hereafter, the Board) currently offers three pathways that predoctoral dental students may choose to obtain initial licensure:

- A clinical and written examination developed by the Board,
- A clinical and written examination administered by the Western Regional Examining Board, or,
- A minimum of 12 months of a general practice residency or advanced education in general dentistry program approved by the American Dental Association's Commission on Dental Accreditation.

All applicants are required to successfully complete the written examinations of the National Board Dental Examination of the Joint Commission on National Dental Examinations and an examination in California law and ethics.

### PORTFOLIO EXAMINATION PATHWAY

Assembly Bill 1524, introduced in February 2009, would eliminate the clinical and written examination currently offered by the Board. Provisions of the bill would allow the Board to offer the portfolio examination as an alternative to initial licensure for general dentists in addition to other pathways available to students graduating from dental schools in California, i.e., the Western Regional Examining Board (WREB) examination and "Licensure by Credential" (PGY-1).

*"...The bill would abolish the clinical and written examination administered by the board. The bill would replace the examination with an assessment process in which an applicant is assessed while enrolled at an in-state dental school utilizing uniform standards of minimal clinical experiences and competencies and at the end of his or her dental program."*

## REQUIREMENTS FOR PORTFOLIO EXAMINATION

Section 3 of the Business and Professions Code is amended to read:

*1632. (a) The board shall require each applicant to successfully complete the written examinations of the National Board Dental Examination of the Joint Commission on National Dental Examinations.*

*1632. (b) The board shall require each applicant to successfully complete an examination in California law and ethics developed and administered by the board. The board shall provide a separate application for this examination.....the only other requirement for taking this examination shall be certification from the dean of the qualifying dental school attended by the applicant that the applicant has graduated, or will graduate, or is expected to graduate.*

*1632. (c) The board shall require each applicant to have taken and received a passing score .....on the portfolio assessment (examination) of the applicant's fitness to practice dentistry while the applicant is enrolled in a dental school program at a board-approved school in California. This assessment shall utilize uniform standards minimal clinical experiences and competencies. The applicant shall pass a final assessment at the end of his or her dental school program.*

## OTHER REQUIREMENTS

Students who participate in the portfolio examination pathway must:

- (a) Be in good academic standing in their institution at the time of portfolio examination and be signed off by the dean of their respective schools.
- (b) Have no pending ethical issues at the time of the portfolio examination and must be signed off by the dean of their respective schools.

## SECTION 3 –THE PORTFOLIO EXAMINATION MODEL

### DEFINITION

Albino, Young, Neumann, Kramer, Andrieu, Henson, Horn, and Hendricson (2008, p. 164) define clinical competency examinations as performance examinations in which students perform designated tasks and procedures on a patient without instructor assistance. The process of care and the products are assessed by faculty observers typically guided by rating scales.

Here, the portfolio examination can be conceptualized as a series of examinations administered in a series of patient encounters in several competency domains. Students are rated according to standardized rating scales by faculty examiners who are formally trained in their use.

### CHARACTERISTICS

The distinguishing characteristics of the portfolio examination fulfill psychometric requirements for classifying the portfolio as an examination.

First, the portfolio examination is considered a performance examination that assesses students' skills in commonly encountered clinical situations. There are multiple clinical situations that allow for an evaluation of the full continuum of competency.

Second, it includes components of clinical examination administered by a regulatory board or regional examining entity.

Third, students' performance is measured according to the information provided in competency evaluations conducted in the schools by clinical faculty within the predoctoral program of education.

Fourth, it produces documented data for outcomes assessment of results, thereby allowing for verification of the validity evidence.

Thus, a portfolio examination involves hands-on performance evaluations of clinical skills as evaluated within the students' program of dental education.

The portfolio examination model is designed to use the structure for student evaluation that currently exists within the schools to assess minimum competence. The faculty would observe the treatment provided and evaluate students according to consistent criteria developed by a consensus of key faculty

from all of the dental schools. Each student would prepare a portfolio of documentation that provides proof of completion of competency evaluations for specific procedures such as amalgam/composite restoration, endodontics, fixed prosthetics, oral diagnosis and treatment planning, periodontics, radiography, and removable prosthodontics.

A portfolio examination model captures the strength of traditional portfolios used to assess learning progress and have the additional advantage of being integrated within the current educational process and within the context of a treatment plan of a patient of record. Instead of developing a traditional portfolio and having it evaluated, the portfolio examination model requires documentation of the test cases (or competency cases) which are competency evaluations assembled in either paper or electronic format. The faculty examiners would attest to the ratings achieved by the students. A portfolio examination would be built and evaluated in real time during students' clinical training. Documentation for the portfolio examination would be submitted in paper or electronic format for the required procedures, e.g., periodontics, endodontics, prosthodontics, restorative).

## UNIQUE FEATURES

The portfolio examination has several unique features:

1. ***Oversight maintained by the Board.***

The Board has the lawful responsibility to ensure that dentists who are licensed possess the competencies to practice safely and that responsibility cannot be delegated.

2. ***Built-in system for auditing the process.***

Upon implementation, a system must be in place to audit the alternative pathway examination. The auditing system must be part of the design requirement of the alternative pathway examination. The auditing system must be designed such that the Board and the examiners have defined responsibilities to ensure that the students who are successful are competent.

3. ***Does not require additional resources from the students, schools, or the Board.***

There are systems and procedures already in place in the dental schools. The structure of the systems and procedures are quite suitable for evaluating students' competence. The systems and procedures are very similar among the dental schools and, with collaboration among the schools, could create a common system.

4. ***Must be instituted within the current systems of student evaluation.***

The standards and criteria for successful performance must be fully established by the schools and consistent application of the standards and criteria would take into account the tremendous amount of work undertaken to comprehensively evaluate the students' clinical skills in a variety of clinical situations.

5. ***Must be considered an examination and meet all professional testing standards.***

Any method or system that evaluates performance and classifies students within a licensing context is considered an examination by professional testing standards and case law.

6. ***Meets psychometric standards, relevant to current practice, and designed for minimum competence.***

Because the portfolio pathway is an examination, it must meet legal standards as explicated in Sections 12944, Section 139, guidelines of the Business and Professions Code and psychometric standards for examinations set forth by the Standards for Educational and Psychological Testing (1999).

7. ***Is designed to cover the full continuum of competence.***

The alternative pathway examination must assess competencies throughout the course of treatment including oral diagnosis and treatment planning, follow-up and ongoing care, restorative (amalgam and composite restoration, fixed prosthetics), endodontics, periodontics, radiography, and removable prosthodontics.

8. ***Evaluation of competence is within the course of treatment plan for patients of record.***

The competency of the students must be evaluated in the course of treatment of a patient. The evaluation of competence should not be in an artificial or contrived situation as may be true when the services are solely for the purpose of training.

9. ***Examiners are regularly calibrated for consistent implementation of the examination.***

The examiners who participate in the alternative pathway examination must be trained and calibrated to ensure that the standards and criteria do not vary

across students. Each student must have a standardized examination experience.

10. ***Has policies and procedures that treat licensure students fairly and professionally, with timely and complete communication of examination logistics and results.***

The alternative pathway examination must be designed such that students are knowledgeable of standards to which they are being held accountable and the procedures that they should follow in order to maximize success.

## SECTION 4 – CONTENT VALIDATION

### APPLICABLE STANDARDS

Since criterion-related evidence is generally not available for use in making licensure decisions, validation of licensure and certification tests rely mainly on expert judgments that the test adequately represents the content domain of the occupation or specialty. Here, content-related validity evidence from a job analysis supports the validity of the portfolio examination as a measure of clinical competence. The Standards contain extensive discussion of validity issues.

*“Test design generally starts with an adequate definition of the occupation or specialty, so that persons can be clearly identified as engaging in the activity.” (p. 156)*

*“Often a thorough analysis is conducted of the work performed by people in the profession or occupation to document the tasks and abilities that are essential to practice. A wide variety of empirical approaches is used, including delineation, critical incidence techniques, job analysis, training needs assessments, or practice studies and surveys of practicing professionals. Panels of respected experts in the field often work in collaboration with qualified specialists in testing to define test specifications, including the knowledge and skills needed for safe, effective performance, and an appropriate way of assessing that performance.” (p. 156)*

*“Credentialing tests may cover a number of related but distinct areas. Designing the testing program includes deciding what areas are to be covered, whether one or a series of tests is to be used, and how multiple test scores are to be combined to reach an overall decision.” (p. 156-157)*

There are also specific standards that address the use of job analysis to define the competencies to be tested in the portfolio examination.

*Standard 14.8*

“Evidence of validity based on test content requires a thorough and explicit definition of the content domain of interest. For selection, classification, and promotion, the characterization of the domain should be based on a job analysis.” (p. 160)

*Standard 14.14*

“The content domain to be covered by a credentialing test should be defined clearly and justified in terms of the importance of the content for credential-worthy performance in an occupation or profession. A rationale should be provided to support the claim that the knowledge or skills being assessed are required for credential-worthy performance in an occupation and are consistent with the purpose for which the licensing or certification program was instituted” (p. 161)

## METHODOLOGY

The methodology used to validate the content of the competency examinations comprising the portfolio examination is a commonly used psychometric procedure called job (aka practice) analysis. Job analysis data is typically obtained through multiple sources including interviews, observations, survey questionnaires, and/or focus groups.

For the portfolio examination, we relied on information obtained from focus groups comprised of participants representing different content domains of practice. This methodology has been used extensively in the measurement field and is described in detail in many publications in the psychometric literature as a “table-top job analysis”, e.g., Department of Energy (1994). Basically, focus group participants identify the competencies to be assessed in a systematic way beginning with an outline of major competency domains and ending with a detailed account of major and specific competencies organized in outline fashion. All participants provide input in a systematic, iterative fashion, until consensus is achieved.

## PROCESS

Separate focus groups from the five Board-approved dental schools were convened to define the content for the portfolio examinations for six competency domains to be assessed in the portfolio examination: comprehensive oral diagnosis and treatment planning, direct and indirect restoration, removable prosthodontics, periodontics, and endodontics.

The content was developed at two levels of analysis. The first level of analysis was to develop a consensus at a broad level regarding the major competencies to be assessed. The faculty indicated that the competencies were acceptable to the schools as the basis for the portfolio examination. They further understood that the major competencies were likely to be included in proposed legislation in order to implement the portfolio examination. The second level of analysis produced detailed procedures for measuring specific subcomponents within each of the six competency domains. The detailed procedures will be used to develop the portfolio examinations.

## PROCEDURE

The procedure was conducted systematically in several steps:

- |  |   |
|--|---|
| <i>Step 1</i><br><i>Orient focus group</i>             | <ul style="list-style-type: none"><li>• Present participants with an outline of topics to be covered for a given competency domain</li><li>• Orient participants as to the goal of the process and how the results will be used</li></ul>         |
| <i>Step 2</i><br><i>Review subject matter</i>          | <ul style="list-style-type: none"><li>• Have participants explain how their program currently conducts competency examinations</li><li>• Review the topics involved in a given competency domain, e.g., periodontics, endodontics, etc.</li></ul> |
| <i>Step 3</i><br><i>Identify major competencies</i>    | <ul style="list-style-type: none"><li>• Identify major competencies to be assessed</li><li>• Discuss implications of the competencies at each participant's program until consensus is reached</li></ul>  |
| <i>Step 4</i><br><i>Identify specific competencies</i> | <ul style="list-style-type: none"><li>• Identify specific competencies within each content domain to be assessed</li><li>• Discuss implications of the competencies at each participant's program until consensus is reached</li></ul>            |
| <i>Step 5</i><br><i>Sequence competencies</i>          | <ul style="list-style-type: none"><li>• Sequence the competencies until consensus is reached</li></ul>  |
| <i>Step 6</i><br><i>Develop competency statements</i>  | <ul style="list-style-type: none"><li>• Rephrase each competency in terms of a consistent format that includes an action verb and direct object (c. f., Chambers &amp; Gerrow, 1994)</li></ul>  |
| <i>Step 7</i><br><i>Refine competencies</i>            | <ul style="list-style-type: none"><li>• Make final edits to the wording of the competencies until consensus is reached</li></ul>  |
| <i>Step 8</i><br><i>Re-evaluate competencies</i>       | <ul style="list-style-type: none"><li>• Discuss the list of major and specific competencies until consensus is reached</li></ul>  |

## SECTION 5 – JOB-RELATED CONTENT OF PORTFOLIO

The portfolio examination is comprised of performance examinations in six competency domains identified by the focus groups using a “table-top job analysis” methodology described in Section 4. The competencies and their subcomponent competencies provide the most fundamental type of validity evidence for the portfolio examination, that is, *content*. The subcomponents of each major competency domain are presented below.

Table 1 – Major competencies and subcomponents

<i>Comprehensive oral diagnosis and treatment planning</i>	<ul style="list-style-type: none"> <li>I. Collect medical and dental history</li> <li>II. Perform comprehensive examination</li> <li>III. Evaluate data to identify problems</li> <li>IV. Work up problems and develop tentative treatment plan</li> <li>V. Develop final treatment plan</li> <li>VI. Prepare documentation according to risk management standards</li> </ul>
<i>Direct restoration</i>	<ul style="list-style-type: none"> <li>I. Restore tooth containing primary carious lesions to optimal form, function and esthetics with Class II amalgam or composite</li> <li>II. Restore tooth containing primary carious lesions to optimal form, function and esthetics with Class III or IV composite</li> <li>III. Restore tooth containing primary carious lesions to optimal form, function and esthetics with Class V glass ionomer, composite or amalgam</li> <li>IV. Select case based on minimum criteria for direct restorations</li> </ul>
<i>Indirect restoration</i>	<ul style="list-style-type: none"> <li>I. Restore tooth to optimal form, function and esthetics with crown or onlay according to approved procedures and materials for indirect restorations</li> <li>II. Select case based on minimum criteria for indirect restorations</li> </ul>
<i>Removable prosthodontics</i>	<ul style="list-style-type: none"> <li>I. Develop diagnosis and determine treatment options and prognosis for removable prosthesis</li> <li>II. Restore edentulous spaces with removable prostheses</li> <li>III. Manage tooth loss transition with immediate or transitional prostheses</li> <li>IV. Manage prosthetic problems</li> <li>V. Direct and evaluate laboratory services for prosthesis</li> </ul>
<i>Endodontics</i>	<ul style="list-style-type: none"> <li>I. Apply case selection criteria for endodontic cases</li> <li>II. Demonstrate pretreatment preparation for endodontic treatment</li> <li>III. Perform access opening</li> <li>IV. Perform shaping and cleaning techniques</li> <li>V. Perform obturation techniques</li> <li>VI. Demonstrate completion of endodontic case</li> <li>VII. Provide recommendations for post-endodontic treatment</li> </ul>
<i>Periodontics</i>	<ul style="list-style-type: none"> <li>I. Perform comprehensive periodontal examination</li> <li>II. Determine diagnosis and develop periodontal treatment plan</li> <li>III. Perform nonsurgical periodontal therapy</li> <li>IV. Perform periodontal re-evaluation</li> </ul>

## SECTION 6 – ANNOTATED OUTLINE OF COMPETENCIES

For each major competency and subcomponent competency domain, focus group participants were asked to provide additional details to specify the scope of the competencies being measured. Below are the competency domains, subcomponent competencies, and specific content to be covered within each subcomponent.

### AREA 1: COMPREHENSIVE ORAL DIAGNOSIS AND TREATMENT PLANNING

- I. Collect medical and dental history
  - A. Evaluate medical history, e.g., past illnesses and conditions, family history, current illnesses and medications, medications and their effect on dental condition
  - B. Obtain dental history, e.g., age of previous prostheses, existing restorations, prior history of orthodontic/periodontic treatment, oral hygiene habits/adjuncts
  - C. Determine chief complaint
  - D. Determine psychosocial issues
  - E. Determine behavioral issues that affect relationship with patient
- II. Perform comprehensive examination
  - A. Interpret radiographic series
  - B. Perform caries risk assessment
  - C. Determine periodontal condition
  - D. Perform head and neck examination
  - E. Screen for temporomandibular disorders
  - F. Assess vital signs
  - G. Perform clinical examination of dentition
  - H. Perform occlusal examination
- III. Evaluate data to identify problems
  - A. List chief complaint
  - B. List medical problems
  - C. List stomatognathic problems
  - D. List psychosocial problems
- IV. Work up problems and develop tentative treatment plan
  - A. Define each problem, e.g., severity/chronicity, classification
  - B. Determine if any additional diagnostic tests are needed
  - C. Develop differential diagnosis
  - D. Recognize need for referral(s)
  - E. Address pathophysiology of problem
  - F. Address short term needs
  - G. Address long term needs

- H. Determine interactions of problems
- I. Develop treatment options
- J. Determine prognosis
- K. Prepare patient information for informed consent
- V. Develop final treatment plan
  - A. Establish rationale for treatment
  - B. Address all problems (any condition that puts the patient at risk in the long term)
  - C. Determine sequencing within the following framework
    1. Systemic: medical issues of concern, medications and their effects, effect of diseases on oral condition, precautions, treatment modifications
    2. Urgent: Acute pain/infection management, urgent esthetic issues, further exploration/additional information, oral medicine consultation, pathology
    3. Preparatory: Preventive interventions, orthodontic, periodontal (Phase I, II), endodontic treatment, oral surgical treatment, TMD treatment, caries control, other temporization
    4. Restorative: operative, fixed, removable prostheses, occlusal splints, implants
    5. Elective: Esthetic (veneers, etc.), any procedure that is not clinically necessary, replacement of sound restoration for esthetic purposes, bleaching
    6. Maintenance: Periodontic recall, radiographic interval, periodic oral examination, caries risk management
- VI. Prepare documentation according to risk management standards

## AREA 2: DIRECT RESTORATION

- I. Restore tooth containing primary carious lesions to optimal form, function and esthetics with Class II amalgam or composite
- II. Restore tooth containing primary carious lesions to optimal form, function and esthetics with Class III or IV composite
- III. Restore tooth containing primary carious lesions to optimal form, function and esthetics with Class V glass ionomer, composite or amalgam
- IV. Select case based on minimum criteria for direct restorations
  - A. Class II – Any permanent posterior tooth
    1. Treatment needs to be performed in the sequence described in the treatment plan
    2. More than one test procedure can be performed on a single tooth; teeth with multiple lesions may be restored at separate appointments
    3. Caries as shown on either of the two required films on an unrestored proximal surface must extend to the dentoenamel junction
    4. Tooth to be treated must be in occlusion
    5. Must have an adjacent tooth to be able to restore a proximal contact; proximal surface of the dentition adjacent to the proposed restoration must be either natural tooth structure or a permanent restoration; provisional restorations or removable partial dentures are not acceptable adjacent surfaces
    6. Tooth must be asymptomatic with no pulpal or periapical pathology; cannot be endodontically treated or in need of endodontic treatment
    7. Tooth with bonded veneer is not acceptable
    8. The lesion is not acceptable if it is in contact with circumferential decalcification
  - B. Class III/IV – Any permanent anterior tooth
    1. Treatment needs to be performed in the sequence described in the treatment plan
    2. More than one test procedure can be performed on a single tooth. Teeth with multiple lesions may be restored at separate appointments.
    3. Caries as shown on the required film on an unrestored proximal surface must extend to the dentoenamel junction
    4. Must have an adjacent tooth to be able to restore a proximal contact; proximal surface of the dentition adjacent to the proposed restoration must be either natural tooth structure or a permanent restoration; provisional restorations or removable partial dentures are not acceptable adjacent surfaces
    5. Tooth must be asymptomatic with no pulpal or periapical pathology; cannot be endodontically treated or in need of endodontic treatment
    6. The lesion is not acceptable if it is in contact with circumferential decalcification

7. Approach must be appropriate for the tooth
8. Tooth with bonded veneer is not acceptable

C. Class V – Any permanent tooth

1. Tooth must have a carious lesion that is clinically evident.
2. Treatment needs to be performed in the sequence described in the treatment plan
3. More than one test procedure can be performed on a single tooth; teeth with multiple lesions may be restored at separate appointments
4. Tooth must be asymptomatic with no pulpal or periapical pathology; cannot be endodontically treated or in need of endodontic treatment; the lesion is not acceptable if it is in contact with circumferential decalcification
5. New restoration must be separate from any existing restoration on the tooth

### AREA 3: INDIRECT RESTORATION

- I. Restore tooth to optimal form, function and esthetics with crown or onlay according to approved procedures and materials for indirect restorations.
  - A. Ceramic restoration must be onlay or more extensive
  - B. Partial gold restoration must be onlay or more extensive
  - C. Metal ceramic restoration
  - D. Full gold restoration
  - E. Facial veneer is not acceptable
- II. Select case based on minimum criteria for indirect restorations.
  - A. Treatment needs to be performed in the sequence described in the treatment plan.
  - B. Tooth must be asymptomatic with no pulpal or periapical pathology; cannot be in need of endodontic treatment. Endodontically treated teeth must follow standard of care.
  - C. Tooth must have opposing occlusion that is stable.
  - D. Must have an adjacent tooth to be able to restore a proximal contact; proximal surface of the tooth adjacent to the planned restoration must be either an enamel surface or a permanent restoration; temporary restorations or removable partial dentures are not acceptable adjacent surfaces
  - E. Tooth must require an indirect restoration at least the size of the onlay or greater.
  - F. Cannot replace existing or temporary crowns
  - G. Buildups may be completed ahead of time, if needed. Teeth with cast posts are not allowed.
  - H. Restoration must be completed on the same tooth and same patient by the same student
  - I. Validated lab or fabrication error will allow a second delivery attempt starting from a new impression or modification of the existing crown.
  - J. Digital media cannot be used to capture impressions.

## AREA 4: REMOVABLE PROSTHODONTICS

- I. Develop diagnosis and determine treatment options and prognosis for removable prosthesis
  - A. Obtain patient history, e.g., medical, dental, psychosocial
  - B. Evaluate chief complaint
  - C. Obtain radiographs and photographs
  - D. Perform clinical examination, e.g., hard/soft tissue charting, endodontic evaluation, occlusal examination, skeletal/jaw relationship, VDO, CR, MIP
  - E. Evaluate existing prosthesis and patient concerns
  - F. Obtain and mount diagnostic cast
  - G. Determine complexity of case, e.g., ACP classification
  - H. Present treatment options and prognosis assessment, e.g., complete denture, partial denture, overdenture, implant options, FPD
  - I. Analyze risks/benefits
  - J. Apply critical thinking and make evidence-based treatment decisions
- II. Restore edentulous spaces with removable prostheses
  - A. Develop diagnosis and treatment plan for removable prosthesis
  - B. Obtain diagnostic casts
  - C. Perform diagnostic wax-up/survey framework design
  - D. Determine need for preprosthetic surgery and make necessary referral
  - E. Perform tooth modification and/or survey crowns
  - F. Obtain master impressions and casts
  - G. Obtain occlusal records
  - H. Try-in and evaluate trial dentures
  - I. Insert prosthesis
  - J. Provide post-insertion care
  - K. Apply standards of care, e.g., infection control, informed consent
- III. Manage tooth loss transition with immediate or transitional prostheses
  - A. Develop diagnosis and treatment plan – tooth salvage/extraction decisions
  - B. Educate patient regarding healing process, denture experience, future treatment needs, etc
  - C. Plan surgical and prosthetic phases
  - D. Obtain casts, e.g., preliminary/final impressions
  - E. Obtain occlusal records
  - F. Perform diagnostic wax-up
  - G. Try-in and evaluate trial dentures
  - H. Manage and coordinate surgical phase
  - I. Insert immediate or transitional prosthesis
  - J. Provide post insertion care including adjustments, relines, patient counseling
  - K. Apply standards of care, e.g., infection control, informed consent
- IV. Manage prosthetic problems
  - A. Assess real or perceived patient problems

- B. Evaluate existing prosthesis
  - C. Perform uncomplicated repair, reline, re-base, re-set or re-do
  - D. Determine need for specialty referral
  - E. Obtain impression/record/information for laboratory use
  - F. Communicate needed prosthetic procedure to laboratory technician
  - G. Insert prosthesis and provide follow-up care
  - H. Perform in-office maintenance, e.g., prosthesis cleaning, clasp tightening, occlusal adjustment
- V. Direct and evaluate laboratory services for prosthesis
- A. Complete laboratory prescription
  - B. Communicate with laboratory technician
  - C. Evaluate laboratory work product, e.g., frameworks, processed dentures

## AREA 5: ENDODONTICS

- I. Apply case selection criteria for endodontic cases
  - A. Meet AAE case criteria for minimum difficulty
    1. Treat simple morphologies of all teeth
    2. Treat teeth that include signs and symptoms of swelling and acute inflammation
    3. Treat teeth without previous complete or partial endodontic therapy
  - B. Determine endodontic diagnosis
  - C. Perform charting and diagnostic testing
  - D. Take and interpret radiographs
  - E. Determine pulpal diagnosis within approved parameters
    1. Within normal limits
    2. Reversible pulpitis
    3. Irreversible pulpitis
    4. Necrotic pulp
  - F. Determine periapical diagnosis within approved parameters
    1. Within normal limits
    2. Asymptomatic apical periodontitis
    3. Symptomatic apical periodontitis
    4. Acute apical abscess
    5. Chronic apical abscess
  - G. Develop endodontic treatment plans including referral, trauma, and management of emergencies
- II. Demonstrate pretreatment preparation for endodontic treatment
  - A. Manage pain control
  - B. Remove caries and failed restorations
  - C. Determine restorability
  - D. Achieve isolation
- III. Perform access opening
  - A. Create indicated outline form
  - B. Create straight line access
  - C. Maintain structural integrity
  - D. Complete unroofing of pulp chamber
  - E. Identify all canal systems
- IV. Perform shaping and cleaning techniques
  - A. Maintain canal integrity
  - B. Preserve canal shape and flow
  - C. Apply protocols for establishing working length
  - D. Manage apical control
  - E. Apply disinfection protocols
- V. Perform obturation techniques
  - A. Apply obturation protocols
    1. Select and fit master cone
    2. Determine canal conditions before obturation

- 3. Verify sealer consistency and adequacy of coating
  - B. Demonstrate length control of obturation
  - C. Achieve dense obturation of filling material
  - D. Demonstrate obturation to a clinically appropriate coronal height
- VI. Demonstrate completion of endodontic case
  - A. Achieve coronal seal to prevent re-contamination
  - B. Create diagnostic, radiographic and narrative documentation
- VII. Provide recommendations for post-endodontic treatment
  - A. Recommend final restoration alternatives
  - B. Provide recommendations for outcomes assessment and follow-up

## AREA 6: PERIODONTICS

- I. Perform comprehensive periodontal examination
  - A. Review medical and dental history
  - B. Interpret radiographs
  - C. Perform extra- and intra-oral examination
  - D. Perform comprehensive periodontal data collection
    1. Evaluate plaque index, probing depths, bleeding on probing, suppuration, cementoenamel junction-gingival margin, clinical attachment level and furcations
    2. Perform occlusal assessment
  - E. Evaluate periodontal etiology/risk factors (local and systemic)
- II. Determine diagnosis and develop periodontal treatment plan
  - A. Determine periodontal diagnosis
  - B. Formulate initial periodontal treatment plan
    1. Determine whether to treat or refer to periodontist
    2. Discuss with patient etiology, benefits of treatment, specific risk factors, alternatives and patient-specific oral hygiene instructions
    3. Determine nonsurgical periodontal therapy including management of contributing factors of periodontitis
    4. Determine need for re-evaluation
    5. Determine recall interval (if no re-evaluation needed)
- III. Perform nonsurgical periodontal therapy
  - A. Detect supra- and subgingival calculus
  - B. Perform periodontal instrumentation
    1. Remove calculus
    2. Remove plaque
    3. Remove stains
  - C. Minimize tissue trauma
  - D. Provide effective anesthesia
- IV. Perform periodontal re-evaluation
  - A. Evaluate effectiveness of oral hygiene care
  - B. Assess periodontal outcomes
    1. Review medical and dental history
    2. Review radiographs
    3. Perform comprehensive periodontal data collection (e.g., evaluate plaque index, probing depths, bleeding on probing, suppuration, cementoenamel junction-gingival margin, clinical attachment level, furcations, tooth mobility)
  - C. Discuss with patient etiology, benefits of treatment, alternatives, patient-specific oral hygiene instructions, and modification of specific risk factors
  - D. Determine further periodontal needs including need for referral to a periodontist and periodontal surgery
  - E. Establish recall interval for periodontal treatment

## SECTION 7 – EVALUATION SYSTEM

A standardized evaluation system will be used as the tool to evaluate students' performance in the competency examinations. To implement the portfolio examination, the competencies and their subcomponents defined in Section 5 will provide the framework for the evaluation system that will assess the students' competencies in the procedures. Faculty from all Board-approved dental schools must be involved in the process so that the final evaluation system represents rating criteria applicable to students regardless of their predoctoral programs.

The evaluation system is intended to be used for *summative* decisions (high-stakes, pass/fail decisions) rather than formative decisions (compilation of daily work with faculty feedback for learning purposes). The evaluation system provides quantitative validity evidence for determining clinical competence in terms of numeric scores.

### APPLICABLE STANDARDS

The evaluation system must meet psychometric criteria to provide the measurement opportunity for success for all students.

- Standard 3.20* “The instructions presented to test takers should contain sufficient detail so that test takers can respond to a task in the manner that the test developer intended. When appropriate, sample material, practice or sample questions...should be provided to test takers prior to the administration of the test or included in the testing material as part of the standard administration instructions.” (p. 47)
- Standard 3.22* “Procedures for scoring and, if relevant, scoring criteria should be presented by the test developer in sufficient detail and clarity to maximize the accuracy of scoring. Instructions for using rating scales or for deriving scores obtained by coding, scaling, or classifying constructed responses should be clear.” (p. 47)
- Standard 14.17* “The level of performance required for passing a credentialing test should depend on the knowledge and skills necessary for acceptable performance in the occupation or profession and should not be adjusted to regulate the number or proportion of persons passing the test.” (p. 162)

## BEHAVIORALLY ANCHORED RATING SCALES

Behaviorally anchored rating scales have unique measurement properties which have been used extensively in medical and dental education as a tool to assess performance. They rely on critical incidents of behavior which may be classified into dimensions unique and independent of each other in their meaning. Each performance dimension is arrayed on a continuum of behaviors and examiners must select the behaviors that most closely describe the student's performance.

There are several steps to develop behaviorally anchored rating scales for the portfolio examination evaluation system:

1. Use the competencies and their associated subcomponents defined by the table-top job analysis discussed in Section 5 as the framework for the evaluation system, e.g., comprehensive oral diagnosis and treatment planning, direct restoration, indirect restoration, removable prosthodontics, endodontics, periodontics
2. Generate critical incidents of ineffective and effective behavior
3. Create performance dimensions that describe the qualities of groups of critical incidents
4. Define performance dimensions in terms of numeric ratings, e.g., 1 to 5, 1 to 7, 1 to 9
5. Retranslate (reclassifying) the critical incidents to ensure that the incidents describe the performance dimensions
6. Identifying six to seven incidents for each performance dimension
7. Refine standardized criteria for each of the competency domains and their subcomponent competencies
8. Establish minimum acceptable competence criteria (passing criteria) for competency examinations

## MINIMUM COMPETENCE

The passing standard for all of the competency examinations will be built into the rating scales when the rating criteria are developed. The rating criteria for minimum competence is best developed by representative faculty who have a solid conceptual understanding of standardized rating criteria and how the criteria will be applied in an operational setting.

Table 2 – Non-inclusive examples of quality evaluation criteria for casting preparations<sup>1</sup>

Rating	Outline	Internal	Retention	Marginal Finish
5	<ul style="list-style-type: none"> <li>Outline fulfills all criteria for proper extension</li> <li>Margins terminate exactly where specified</li> <li>Margins terminate on smooth, clean, finshable tooth structure</li> </ul>	<ul style="list-style-type: none"> <li>Optimal reduction to allow for proper contour, strength and esthetics of completed restoration</li> <li>Indicated bases and/or build-up properly placed</li> </ul>	<ul style="list-style-type: none"> <li>Maximum length of axial first plane walls and internal walls compatible with periodontal health, pulpal health and strength of tooth.</li> <li>Secondary retentive features placed as indicated with maximum length, property depth, parallel with path of insertion,</li> </ul>	<ul style="list-style-type: none"> <li>Enamel walls supported by dentin</li> <li>Margins terminate with proper angulation</li> <li>Finish lines are smooth and free of irregularities</li> <li>Finish lines are continuous</li> <li>Preparation is isolated to allow for evaluation</li> </ul>
4	<ul style="list-style-type: none"> <li>Outline form does not fulfill all criteria for proper extension in one area but is still acceptable and does not require alteration</li> <li>Minimal abrasion of the adjacent tooth in one area that requires smoothing</li> </ul>	<ul style="list-style-type: none"> <li>Deviates from ideal in one area but still within acceptable range; allows for fabrication of a satisfactory restoration</li> </ul>	<ul style="list-style-type: none"> <li>Retention adequate but not optimal in an isolated area</li> </ul>	<ul style="list-style-type: none"> <li>Deviates from the ideal in one area but is still within acceptable range and will allow for fabrication of satisfactory restoration</li> </ul>
3	<ul style="list-style-type: none"> <li>Outline form does not fulfill all criteria for proper extension in multiple areas but is acceptable and does not require alteration</li> </ul>	<ul style="list-style-type: none"> <li>Deviates from ideal in multiple areas but still within acceptable range</li> </ul>	<ul style="list-style-type: none"> <li>Retention adequate but not optimal in multiple areas</li> </ul>	<ul style="list-style-type: none"> <li>Deviates from the ideal in multiple areas but is still within acceptable range and will allow for fabrication of satisfactory restoration</li> </ul>
2	<ul style="list-style-type: none"> <li>Outline form does not fulfill the criteria for proper extensions and is unacceptable requiring alteration of preparation</li> <li>Cutting the adjacent tooth requires recontouring adjacent tooth</li> </ul>	<ul style="list-style-type: none"> <li>Deviates from the acceptable range and will not allow for fabrication without modification</li> <li>Caries remaining in preparation</li> </ul>	<ul style="list-style-type: none"> <li>Retention is not satisfactory and requires modification</li> </ul>	<ul style="list-style-type: none"> <li>Deviates from the ideal in more than one area and requires modification to fabricate an acceptable restoration</li> </ul>
1	<ul style="list-style-type: none"> <li>Outline form does not fulfill all criteria for proper extension and requires alteration of the preparation</li> <li>Cuts the adjacent tooth</li> <li>Damages the periodontium</li> </ul>	<ul style="list-style-type: none"> <li>Severely deviates from acceptable in one area and deviates from acceptable in multiple areas</li> <li>Mechanical exposure of pulp or perforation of root</li> </ul>	<ul style="list-style-type: none"> <li>Retention severely inadequate and requires extensive modification</li> </ul>	<ul style="list-style-type: none"> <li>Severely deviates from the ideal in one or more areas and requires modifications to fabricate an acceptable restoration</li> </ul>

<sup>1</sup> Adapted from University of Southern California quality evaluation criterion for casting preparations. Not all anchors from the criteria were used.

## SECTION 8 – EXAMINER TRAINING AND CALIBRATION

In order to meet the standard required for psychometrically sound examinations, training and calibration procedures must be linked back to the competencies defined by a job analysis and to the evaluation system. All the schools must calibrate their faculty to the same rating criteria. Again, faculty from all Board-approved dental schools must be involved in the process to ensure those faculty apply the same standards to students' performance. It is very important for the Board to be aware of threats to the validity of the examination that arise from improper training and calibration. If the examiners are improperly trained and calibrated, the examiners would compromise the portfolio examination's ability to produce results that warrant valid conclusions about students' clinical competence.

### APPLICABLE STANDARDS

- Standard 5.1* "Test administrators should follow carefully the standardized procedures for administration and scoring as specified by the test developer, unless the situation or a test taker's disability dictates an exception should be made." (p. 63)
- Standard 5.8* "Test scoring services should document the procedures that were followed to assure accuracy of scoring. The frequency of scoring errors should be monitored and reported to users of the service on reasonable request. Any systematic source of scoring errors should be corrected." (p. 64)
- Standard 5.9* "When test scoring involves human judgment, scoring rubrics should specify criteria for scoring. Adherence to established scoring criteria should be monitored and checked regularly. Monitoring procedures should be documented." (p. 65)

### EXAMINER SELECTION CRITERIA

Examiners will be dental school faculty trained to use a standardized evaluation system through didactic and experiential methods. Each examiner will be required to submit credentials to document their qualifications and experience in conducting examinations in an objective manner.

During hands-on training, examiners will be provided feedback about their performance and how their scoring varies from their fellow examiners. Examiners whose error rate exceeds a prespecified percentage error will be re-

calibrated. If any examiner is unable to be re-calibrated, the Board would dismiss the examiner from the portfolio examination process.

## PROCESS

Examiners will be asked to review a variety of materials, e.g. online overview of process, examiner training manuals, slide presentations (Powerpoint), sample cases, sample documentation, DVD, etc., prior to participating in the actual rating of students.

Training activities will have multiple examples of performance that clearly relate to the specific judgments that examiners are expected to provide during the competency examinations. Hands-on training sessions should include an overview of the rating process, clear examples of rating errors, examples of how to mark the grading forms, a series of several sample cases for examiners to hone their skills, and numerous opportunities for training staff to provide feedback to individual examiners.

There are several steps in the process:

1. Establish agreement among all the schools as to the level of performance represented by the competencies represented in the evaluation
2. Train all faculty from all the dental schools involved in portfolio examination to use standardized criteria to agreed upon set standards for interrater reliability
3. Build in a process for faculty from other schools to participate in evaluating students in competency examinations
4. Develop an evaluation system and calibration process that is iterative and involves individual feedback so that mid-course modifications can be made to improve the system as necessary
5. Conduct calibration regularly to maintain common standards as a ongoing process

## TYPES OF RATING ERRORS

The competency examinations have the potential to introduce error to the score that is unrelated to the reliability of the examination. Several common rating errors can interfere with the rating process by diminishing the accuracy, effectiveness and fairness of the ratings (Cascio, 1992). Rating errors can be avoided by developing scoring criteria that clearly define acceptable and unacceptable performance.

- Halo effect: Inappropriate generalization from one aspect of an individual's performance to all areas of the person's performance
- Contrast effect: Tendency to rate persons in comparison to others

- Stereotyping: Tendency to generalize, favorably or unfavorably, across groups and ignore individual differences
- Central tendency: Inclination to rate students in the middle of the rating scale even when student performance merits higher or lower ratings
- Negative/positive skew: Inclination to rate students higher or lower than their performance warrants
- Recency effect: Tendency to discount events that occurred early in the rating period and overemphasize those that occurred later.

## CROSS-TRAINING OF EXAMINERS

Training sessions will be conducted on an ongoing basis in both northern and southern California, with the expectation that examiners participating in the portfolio examination process will have ample opportunities to participate in competency examinations conducted at a school other than their own. It may not be necessary to have examiners from other schools rate each and every student; however, periodic participation of examiners from outside schools can strengthen the credibility of the process and ensure objectivity of ratings.

## SECTION 9 – AUDIT PROCESS

The purpose of the audit should be to determine if the schools are following the procedures established for the evaluation system and calibration process. The design of the evaluation system and the calibration process will be sufficiently robust to ensure that only the students who meet the passing criteria would be issued a license. The Dental Board should oversee the auditing process and establish standards necessary for public protection in cooperation with dentists who are knowledgeable of the portfolio examination and licensing standards.

During an audit, in-depth information is obtained about the administrative and psychometric aspects of the portfolio examination, much like the accreditation process. An audit team comprised of faculty from the dental schools and persons designated by the Board would verify compliance with accepted professional testing standards, e.g., Standards for Educational and Psychological Testing, as well as verify whether the portfolios have been implemented according to the goals of the portfolio process.

### APPLICABLE STANDARDS

*Standard 3.15* “When using a standardized testing format to collect structured behavior samples, the domain, test design, test specifications and materials should be documented as for any other test. Such documentation should include a clear definition of the behavior expected of the test takers, the nature of expected responses, and any materials or directions that are necessary to carry out the testing.” (p. 46)

### PROCESS

There are several steps in the process:

1. Develop documents for evaluating the schools compliance with the evaluation system and calibration process
2. Train auditors in the evaluation system and calibration process
3. Develop criteria for auditors to apply in reviewing schools’ compliance with the evaluation system and calibration process
4. Select auditors who can maintain the principle of independence
5. Develop self-assessment protocols and schedules for schools to complete

## ROLE OF AUDITORS

The audit team is responsible for verification of the examination process and examination results, and, collection and evaluation of specific written documentation which respond to a set of standardized audit questions and summarizing the findings in a written report. A site visit can be conducted to verify portfolio documentation and clear up unresolved questions.

The audit team would be comprised of persons who can remain objective and neutral to the interests of the school being audited. The audit team should be knowledgeable of subject matter, psychometric standards, psychometrics and credentialing testing.

The audit team should be prepared to evaluate the information provided in a written report that documents the strengths and weaknesses of each school's administrative process and provides recommendations for improvement.

## DOCUMENTATION FOR VALIDITY EVIDENCE

Each student will have a portfolio of completed, signed rating (grade) sheets which provide evidence that clinical competency examinations in the six areas of practice have been successfully completed.

In addition to the signed rating (grade) sheets, there is content-specific documentation that must be provided. A list of acceptable documentation is presented on the following page.

Table 3 – Content-specific documentation

<i>COMPREHENSIVE ORAL DIAGNOSIS AND TREATMENT PLANNING</i>	<ul style="list-style-type: none"> <li>• Full workup of case</li> </ul>
<i>DIRECT RESTORATION</i>	<ul style="list-style-type: none"> <li>• Restorative diagnosis and treatment plan</li> <li>• Preoperative radiographs, e.g., original lesion in Class II, III, IV</li> <li>• Postoperative radiographs including final fill</li> </ul>
<i>INDIRECT RESTORATION</i>	<ul style="list-style-type: none"> <li>• Restorative diagnosis and treatment plan</li> <li>• Preoperative radiographs</li> <li>• Postoperative radiographs including successfully cemented crown or onlay</li> </ul>
<i>REMOVABLE PROSTHODONTICS</i>	<ul style="list-style-type: none"> <li>• Removable prosthodontic diagnosis and treatment plan</li> <li>• Preoperative radiographs illustrating treatment condition</li> <li>• Preoperative and postoperative intraoral photographs of finished appliance</li> </ul>
<i>PERIODONTICS</i>	<ul style="list-style-type: none"> <li>• Periodontal diagnosis and treatment plan</li> <li>• Charted pocket readings</li> <li>• Preoperative radiographs including subgingival calculus</li> <li>• Postoperative radiographs</li> <li>• Follow-up report</li> </ul>
<i>ENDODONTICS</i>	<ul style="list-style-type: none"> <li>• Endodontic diagnosis and treatment plan</li> <li>• Preoperative radiographs of treatment site</li> <li>• Postoperative radiographs of treatment site</li> </ul>

## SECTION 10 – RESEARCH FINDINGS

### PSYCHOMETRIC ISSUES

Several researchers comment that if portfolios are used for summative rather than formative purposes, it must meet stringent psychometric requirements including standardization, rater training with structured guidelines for making decisions, and large numbers of examiners to average out rater effects (Driessen, van der Vleuten, Schuwirth, Tartwijk & Vermunt, 2005, p. 215; Davis & Ponnamparuma, 2005, Friedman Ben-David, Davis, Harden, Howie, Ker, & Pippard, 2001).

Friedman et al. (2001) note that the validity of the inferences made about the portfolio depend on the reliability of the test. If the test scores or ratings suffer from low interrater agreement or poor sampling, inferences cannot be made. Moreover, there should be a clear definition of the purpose of the portfolio and identification of the competencies to be assessed. Webb, Endacott, Gray, Jasper, McMullan and Scholes (2003) and McMullan (2003) cite several criteria that should be used to evaluate portfolio assessments, namely, explicit grading criteria, evidence from a variety of sources, internal quality assurance processes, and external quality assurance processes.

Content validity is important in developing an examination for initial licensure (Chambers, 2004) such that there should be a validation process that inquires whether tasks being evaluated should be representative of tasks critical to safe and effective practice. A recent paper by Patterson, Ferguson, and Thomas (2008) calls for validation by using a job analysis to identify core and specific competencies.

A recent paper entitled “Point/Counterpoint: Do portfolio assessments have a place in dental licensure?” addresses many of these issues specifically as they pertain to the purpose of licensure rather than education (Hammond & Buckendahl, 2006; Ranney & Hambleton, 2006).

Hammond and Buckendahl do not support the use of portfolios for dental licensure. They cite two issues as important in considering the use of portfolio assessments for licensure purposes. First, standardizing the training and evaluation across a broad range of locations would be difficult. Second, demonstrations of abilities in past records would need to be verified so that there is an evaluation of the current range of competencies. These authors contend that the portfolio does not provide an assessment of minimum skills that is administered *independent* of the training program to support licensure decisions;

and therefore, provides no external validation and verification of the students' competence. Moreover, there may be measurement error, or low reliability, within the system as a result of errors in content sampling, number of observations of performance, number of examiners rating the student's performance, assumptions of unidimensional relationships between items, lack of interrater agreement, and reliance on pairs rather than triads of examiners for all students.

In an opposing point of view in the same article, Ranney and Hambleton (2006) support the use of portfolios for dental licensure. According to these authors, testing agencies have published little or no data to allow an assessment of reliability of validity of their examinations. Variability in the reliability of clinical licensure examinations and pass rates among testing agencies may reflect lack of reliability or validity in the examination process, and, omission of skills necessary to practice safely at the entry level, not just changes in student populations. The authors recognize that several criteria would need to be met before portfolio assessment could be implemented. The most important of these criteria are: administration by independent parties, inclusion of a full continuum of student competencies for comprehensive evaluation, and, evaluating competence within the context of a treatment plan designed to meet the patient's oral health care needs. In their discussion, the authors believe that portfolio assessments could work if the developers considered which tasks to measure, how the tasks would be scored, calibration protocols for examiners, and how performance expectations would be set.

## INITIAL LICENSURE REQUIREMENTS IN OTHER JURISDICTIONS

According to the American Association of Dental Examiners "Composite" issued in January 2009, virtually all states and U. S. territories require applicants to pass an examination administered by the National Board of Dental Examiners.

- Forty-seven jurisdictions accepted a regional clinical examination, e.g., WREB, SRTA, CRDTS or national clinical, e.g., ADEX, ADLEX.
- Four jurisdictions, other than California, administered a state clinical examination
- Forty-three jurisdictions administered a jurisprudence examination
- Four states, other than California, granted licensure after completion of an accredited, 12-month, postgraduate residency program
- Six states allow applicants to take any state or regional clinical examination; Virginia explicitly states that the clinical examination must use live patients
- Two states (Montana and Utah) accept California's clinical examination

Table 4 – Summary of existing requirements for initial licensure<sup>2</sup>

State	National Board	Regional clinical	State clinical	Jurisprudence	Other
AL	Y	N	Y	Y	
AK	Y	Y (WREB)	N	Y	
AZ	Y	Y (WREB)	N	Y	
AR	Y	Y (SRTA)	N	Y	
CA	Y	Y (WREB)	Y	Y	PGY-1
CO	Y	Y (CRTDS)	N	Y	
CT	Y	Y (NERB OR DSCE)	N	N	PGY-1
DE	Y	N	Y	Y	DOR
District of Columbia	Y	Y	Y	Y	
FL	Y	N	Y	Y	
GA	Y	Y (CRDTS)	N	Y	
HI	Y	N	N	N	ADEX
ID	Y	Y (WREB, CRDTS)	N	Y	ADEX
IL	Y	N	N	N	ADEX
IN	Y	Y (WREB, SRTA, CRDTS, NERB)	N	Y	
IA	Y	Y (CRDTS, WREB)	N	Y	ADEX
KS	Y	Y (WREB, SRTA, CRDTS, NERB, CITA)	Y	Y	
KY	Y	Y (SRTA, WREB, CRDTS, NERB)	N	Y	ADEX not accepted
LA	Y	Y (CITA, CRDTS, NERB, SRTA, WREB)	N	Y	ADEX
ME	Y	Y (NERB)	N	Y	
MD	Y	Y (NERB)	N	Y	
MA	Y	Y	N	Y	
MI	Y	Y (NERB, DSCE)	--	--	
MN	Y	Y (NDEB, WREB)	N	Y	PGY-1, ADLEX, ADEX
MS	Y	Y	N	Y	
MO	Y	Y (Any state or regional examination)	N	Y	

<sup>2</sup> Examination acronyms for states which specified regional examinations: ADEX = American Board of Dental Examiners; ADLEX = American Dental Licensing Examination; CITA = Council of Interstate Testing Agencies; CRTDS = Central Regional Dental Testing Service; DOR = Dental Operating Rooms at Naval dental facilities; DSCE = Dental Simulated Clinical Examination; NERB = North East Regional Board; NDEB = National Dental Examining Board of Canada; SRTA = Southern Regional Testing Agency; WREB = Western Regional Examining Board

State	National Board	Regional clinical	State clinical	Jurisprudence	Other
MT	Y	Y (WREB, CRDTS, WREB, SRTA, NERB)	N	Y	State clinical examinations from CA, DE, FL, and NV
NE	Y	Y (CRDTS, NERB)	N	Y	
NV	Y	N	--	Y	ADEX; no licensure by credential
NH	Y	Y (NERB)	N	Y	
NJ	Y	Y (NERB)	N	Y	ADEX
NM	Y	Y (WREB, CRDTS)	N	Y	
NY	Y	N	N	N	CDA approved residency; one-time jurisprudence examination
NC	Y	Y (CITA)	N	Y	Sterilization/infection control examination
ND	Y	Y (NERB, CRDTS)	N	Y	ADEX
OH	Y	Y (CRDTS, SRTA, WREB, NERB)	N	Y	
OK	Y	Y (WREB)	N	Y	
OR	Y	Y	N	Y	Accepts any state or regional examination
PA	Y	Y (NERB)	N	N	ADLEX
Puerto Rico	Y	CITA	Y	Y	CITA in lieu of state clinical examination
RI	Y	Y (NERB)	N	N	
SC	Y	Y (SRTA, CRDTS)	N	Y	ADLEX
SD	Y	Y (CRDTS, WREB)	N	Y	Accepts any state or regional examination for licensure by credential
TN	Y	Y (SRTA, WREB)	N	N	
TX	Y	Y	--	Y	Accepts any state or regional examination for licensure by credential
UT	Y	Y (WREB, SRTA, NERB, CRDTS)	N	N	California state examination, Hawaii examination
VT	Y	Y (NERB, WREB, SRTA, CRDTS, CITA)	N	Y	

State	National Board	Regional clinical	State clinical	Jurisprudence	Other
VA	Y	Y (SRTA, WREB, DRDTS, NERGE, CITA)	--	Y	Accepts any state or regional examination for licensure by credential (only if live patients used)
U. S. Virgin Islands	--	--	--	--	
WA	Y	Y	N	Y	PGY-1; Accepts any state or regional examination
WV	Y	Y	N	Y	Any state or regional examination
WI	Y	Y (CRDTS, WREB, NERB)	N	Y	ADEX I and II
WY	Y	Y (CRDTS, WREB, NERB)	N	Y	Part IV of ADEX

#### COMPARISON OF REQUIREMENTS IN THE U.S. AND CANADA

In their 2001 review of dental education and licensure, the Council on Dental Education of the American Dental Association (ADA) compared practices for initial dental licensure in the United States and Canada. Their findings indicate that initial licensure in the United States and Canada are very similar; however, Canada relies on the use of the OSCE, which requires students to answer multiple-choice questions about radiographs, case histories, and/or models in a series of stations. In the OSCE, simulated patients (manikins) rather than actual patients are used as subjects for examination procedures.

Table 5 – Comparison of practices in U. S. and Canada for initial licensure

Requirement	United States	Canada
Graduation from an accredited program	Yes; program is accredited by the ADA Commission on Dental Accreditation	Yes; program is accredited by the Commission on Dental Accreditation of Canada
Written examination	Yes: National Dental Board Examinations (NDBE) Parts I and II	Yes; National Dental Examining Board of Canada Written Examination (NDEB)
Clinical examination	<ul style="list-style-type: none"> <li>• Regionally administered clinical examinations Central Regional Testing Services (CRTS); Northeast Regional Examining Board (NERB), Southern Regional Testing Agency (SRTA), Western Regional Examining Board (WREB) offered once to multiple times, depending on the testing agency</li> <li>• 10 states (CA, DE, FL, HI, IN, LA, MS, NC, NV plus Puerto Rico and the Virgin Islands) offer state administered examinations</li> <li>• Each state determines which clinical examination results are accepted for the purpose of licensure</li> <li>• All states require completion of both written and clinical examinations before being eligible for licensure</li> <li>• Some states also require additional criteria such as proof of malpractice insurance, certification in Basic Life Support, or a jurisprudence examination</li> </ul>	<ul style="list-style-type: none"> <li>• OSCE offered three times a year</li> <li>• Quebec requires an NDEB certificate or a provincial examination.</li> <li>• Some provinces require completion of an ethics examination</li> </ul>

## EXISTING COMPETENCY EXAMINATIONS

As expected, all of the California schools included competencies which met minimum standards set forth by the Commission on Dental Accreditation for predoctoral dental education programs (2008, Standard 2-25, p. 15): “At a minimum graduates must be competent in providing oral health care with the scope of general dentistry, as defined by the school, for the child, adolescent, adult, and geriatric patient, including:

- a) Patient assessment and diagnosis;
- b) Comprehensive treatment planning;
- c) Health promotion and disease prevention;
- d) Informed consent;
- e) Anesthesia, and pain and anxiety control;
- f) Restoration of teeth;
- g) Replacement of teeth;
- h) Periodontal therapy;
- i) Pulpal therapy;
- j) Oral mucosal disorders;
- k) Hard and soft tissue surgery;
- l) Dental emergencies;

- m) Malocclusion and space management; and,
- n) Evaluation of the outcomes of treatment.

Key faculty from each of the five Board-approved schools were interviewed regarding the clinical dimensions of practice assessed in competency examinations within their predoctoral programs. All of the schools provided a list of the clinical competencies assessed during predoctoral training. A list of each school's competency examination is presented in the Tables 6, 7, 8, 9 and 10.

Table 6 – Competency examinations: Loma Linda University

<i>Comprehensive diagnosis and treatment planning</i>	<ul style="list-style-type: none"> <li>• Oral diagnosis examination</li> <li>• Radiology interpretation (FMX pathology)</li> <li>• Radiology interpretation (Normal and errors)</li> <li>• Radiology techniques</li> </ul>
<i>Direct restoration</i>	<ul style="list-style-type: none"> <li>• Class II composite resin</li> <li>• Class II amalgam</li> <li>• Class III composite</li> </ul>
<i>Indirect restoration</i>	<ul style="list-style-type: none"> <li>• Full gold crown, partial coverage crown, full coverage ceramic crown, fixed partial denture <u>or</u> multiple tooth restoration</li> </ul>
<i>Removable prosthodontics</i>	<ul style="list-style-type: none"> <li>• Rest seat preparation</li> <li>• RPD design</li> <li>• CD setup</li> </ul>
<i>Periodontics</i>	<ul style="list-style-type: none"> <li>• Preclinical OSCE (5)</li> <li>• Scaling and root planning (2)</li> <li>• Oral health care (2)</li> </ul>
<i>Endodontics</i>	<ul style="list-style-type: none"> <li>• Endodontic qualifying examination (to treat patients in clinic)</li> <li>• Endodontic section of Fall mock board</li> <li>• Endodontic qualifying examination (to take WREB)</li> </ul>

Table 7 – Competency examinations: University of California Los Angeles

<i>Comprehensive diagnosis and treatment planning</i>	<ul style="list-style-type: none"> <li>• Oral diagnosis</li> <li>• Head and neck examination</li> <li>• Treatment planning</li> <li>• Caries management by risk assessment</li> </ul>
<i>Direct restoration</i>	<ul style="list-style-type: none"> <li>• Class II amalgam (2)</li> <li>• Class II composite (1)</li> <li>• Class III composite or Class V composite (2)</li> <li>• Two buildups (core, pin, prefabricated post and core, <u>or</u> dowel core)</li> </ul>
<i>Indirect restoration</i>	<ul style="list-style-type: none"> <li>• Two restorations (PFM, bonded ceramic, full gold crown <u>or</u> partial veneer crown)</li> </ul>
<i>Removable prosthodontics</i>	<ul style="list-style-type: none"> <li>• Complete denture</li> <li>• Immediate full denture</li> <li>• Removable partial denture</li> <li>• Reline</li> </ul>
<i>Periodontics</i>	<ul style="list-style-type: none"> <li>• Periodontal diagnosis and treatment plan</li> <li>• Periodontal instrumentation</li> <li>• Re-evaluation of Phase I therapy</li> <li>• Periodontal surgery</li> </ul>
<i>Endodontics</i>	<ul style="list-style-type: none"> <li>• Endodontic case portfolio</li> </ul>

Table 8 – Competency examinations: University of California San Francisco

<i>Comprehensive diagnosis and treatment planning</i>	<ul style="list-style-type: none"> <li>• Medical/dental history taking</li> <li>• Infection control</li> <li>• Practice management</li> <li>• Oral diagnosis and treatment planning OSCE</li> <li>• Caries risk assessment</li> <li>• Complete oral examination/treatment planning</li> <li>• Radiology</li> <li>• Emergency</li> <li>• Baseline skills attainment</li> <li>• Pediatric comprehensive oral examination</li> <li>• Outcomes of care</li> </ul>
<i>Direct restoration</i>	<ul style="list-style-type: none"> <li>• Class I composite or preventive resin restoration</li> <li>• Class I amalgam</li> <li>• Class II amalgam</li> <li>• Class II composite</li> <li>• Class III or IV composite</li> <li>• Class V composite, glass ionomer <u>or</u> amalgam</li> <li>• Pediatric restorative</li> </ul>
<i>Indirect restoration</i>	<ul style="list-style-type: none"> <li>• Mounted diagnostic cast</li> <li>• Die trimming</li> <li>• Casting (PFM, all gold, <u>or</u> all ceramic crown)</li> </ul>
<i>Removable prosthodontics</i>	<ul style="list-style-type: none"> <li>• Removable prosthodontics (partial <u>or</u> full denture)</li> </ul>
<i>Periodontics</i>	<ul style="list-style-type: none"> <li>• Instrument sharpening</li> <li>• Instrument identification and adaptation</li> <li>• Scaling and root planning</li> </ul>
<i>Endodontics</i>	<ul style="list-style-type: none"> <li>• Single-root root canal</li> <li>• Multi-root root canal on typodont</li> </ul>

Table 9 – Competency examinations: University of the Pacific

<i>Comprehensive diagnosis and treatment planning</i>	<ul style="list-style-type: none"> <li>• Oral diagnosis and treatment planning</li> </ul>
<i>Direct restoration<sup>3</sup></i>	<ul style="list-style-type: none"> <li>• Class I resin</li> <li>• Class II resin</li> <li>• Class II amalgam</li> <li>• Class III resin</li> <li>• Class V resin</li> </ul>
<i>Indirect restoration</i>	<ul style="list-style-type: none"> <li>• All cases evaluated for case management, buildup (if needed), preparation and temporization</li> <li>• Crown preparation and crown (FVM, PFM <u>or</u> all ceramics)</li> <li>• CIMOE (cementation)</li> <li>• Impression</li> </ul>
<i>Removable prosthodontics</i>	<ul style="list-style-type: none"> <li>• Complete denture, immediate complete denture <u>or</u> other removable prosthetic device</li> </ul>
<i>Periodontics</i>	<ul style="list-style-type: none"> <li>• Periodontal oral diagnosis and treatment planning</li> <li>• Periodontal diagnostic competency</li> <li>• Calculus detection and root planing</li> <li>• Instrument sharpening</li> <li>• Periodontal re-evaluation</li> </ul>
<i>Endodontics</i>	<ul style="list-style-type: none"> <li>• Endodontic radiographic technique</li> <li>• Cleaning and shaping (single canal)</li> <li>• Coronal access anterior</li> <li>• Coronal access posterior</li> <li>• Obturation (single canal)</li> </ul>

<sup>3</sup>All direct restoration cases are evaluated for case management, preparation and restoration. Typically Class III and Class V resins are performed in the anterior segments; several posterior Class II restorations are completed including a mandatory mock board scenario—mixed between amalgam and resin

Table 10 – Competency examinations: University of Southern California

Competency domain	Specific competencies
<i>Comprehensive diagnosis and treatment planning</i>	<ul style="list-style-type: none"> <li>• Oral radiology (OSCE in radiology)</li> <li>• Physical evaluation</li> <li>• Ultrasonic instrumentation/ultrasonic scaler</li> <li>• OSCE in vital signs, extra- and intraoral examination and infection control</li> </ul>
<i>Direct restoration</i>	<ul style="list-style-type: none"> <li>• Class II amalgam</li> <li>• Composite restoration (Class II, III, IV, <u>or</u> V)</li> </ul>
<i>Indirect restoration</i>	<ul style="list-style-type: none"> <li>• Crown preparation (PFM, full gold, partial veneer gold, <u>or</u> ceramic)</li> <li>• Crown cementation (PFM, full gold, partial veneer gold, <u>or</u> ceramic)</li> </ul>
<i>Removable prosthodontics</i>	<ul style="list-style-type: none"> <li>• Preliminary Impression</li> <li>• Outline tray(s)/ custom tray(s)</li> <li>• Final impression(s)</li> <li>• Final survey</li> <li>• Framework try-in (retention/occlusion)</li> <li>• Jaw record(s)/ tooth selection</li> <li>• Teeth try-in/ remount jig</li> <li>• Prosthesis placement/ clinical remount</li> <li>• Final adaptation and articulation</li> </ul>
<i>Periodontics</i> <sup>4</sup>	<ul style="list-style-type: none"> <li>• Diagnosis and comprehensive treatment planning</li> <li>• Ultrasonic instrumentation for scaling and root planning</li> <li>• Scaling and root planning</li> <li>• Mock board examination (WREB compatible)</li> </ul>
<i>Endodontics</i>	<ul style="list-style-type: none"> <li>• Access</li> <li>• Instrumentation</li> <li>• Obturation</li> </ul>

## CALIBRATION OF EXAMINERS

During visits to the dental school clinics and interviews with faculty, it was clear that the dental schools did an exceptional job in calibrating their examiners and were consistent in their methodology to ensure that common criteria were used to evaluate students' performance on competency examinations. The faculty were calibrated and re-calibrated to ensure consistency in their evaluation of the student competencies and the processes used by the dental schools for assessing competencies was very similar. In every case, minimum competency was built into the rating scales used to evaluate the students in their competency examinations.

The general rule was that two examiners must concur on failing grades. If there is disagreement between the two examiners, a third examiner was asked to grade the student. One school specifically mentioned that examiners were designated full-time faculty who were familiar with the grading criteria and the logistics of competency examinations. Other schools mentioned that their examiners (part-time and full-time faculty) were provided extensive materials to

<sup>4</sup> Diagnosis and comprehensive treatment planning, ultrasonic instrumentation, scaling and root planing are performed in the junior year; mock board examination performed in the senior year

read and review prior to hands-on training with experienced examiners. These materials included detailed examiner training manuals, detailed slide presentations (PowerPoint), sample cases, and sample documentation. Hands-on training and calibration sessions were conducted to ensure that the examiners understood the evaluation system and how to use it.

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**APPENDIX A – CONSULTANT BACKGROUND**

**NORMAN R. HERTZ, PH.D.**  
**DIRECTOR OF PSYCHOMETRIC SERVICES**

Dr. Hertz is the Director of Psychometric Services at Comira. He is a licensed psychologist with more than 25 years of experience in the measurement field. He received his Bachelor of Arts degree from Baylor University in psychology, and his Master of Science degree in psychology and his Ph.D. in industrial-organizational psychology from the University of Memphis.

He was the managing partner of HZ Assessments, a private psychometric consulting firm that he co-founded after his retirement from the California Department of Consumer Affairs in 2001. He has provided psychometric expertise to national and international organizations and has developed licensing and certification examinations for several western states including California, Washington, Oregon, and Arizona. He has extensive experience in private industry and government settings and has conducted validation studies, developed licensing and certification examinations, and established cut scores for more than 50 professions, ranging from the construction trades to medical specialties. He specializes in conducting psychometric audits of examination programs.

Prior to HZ Assessments and Comira, Dr. Hertz was the Chief of the Office of Examination Resources at the California Department of Consumer Affairs for 15 years. During his tenure at Consumer Affairs, he handled the most sensitive aspects of examination programs for more than 30 boards including expert witness testimony for legislative committees.

He has chaired and presented at the annual meetings of the Council on Licensure, Enforcement and Regulation and the National Council on Measurement in Education and has also co-authored several technical papers and journal articles. He is a member of the American Psychological Association, the Society for Industrial Organizational Psychology, the American Educational Research Association, the National Council on Measurement in Education, and the Council on Licensure, Enforcement and Regulation.

**ROBERTA N. CHINN, PH.D**  
**SENIOR PSYCHOMETRIC SPECIALIST**

Dr. Roberta Chinn is the Senior Psychometric Specialist at Comira. She has more than 19 years of experience in the measurement field. She received her Bachelor of Science degree from the University of California at Davis in psychology, her Master of Arts degree from the University of the Pacific in experimental psychology, and her Ph.D. in experimental and cognitive psychology from Louisiana State University.

She was a general partner in HZ Assessments, a private psychometric consulting firm that she co-founded in 2001. Prior to HZ Assessments and Comira, Dr. Chinn was a senior psychometric consultant at the Office of Examination Resources at the California Department of Consumer Affairs for over 11 years. During her tenure at Consumer

Affairs, she handled sensitive aspects of examination programs for more than 30 boards and was instrumental in the development of standardized practical examinations, applied law and ethics examinations, and standardized oral examinations.

She has developed licensing and certification examinations for several western states (e.g., California, Colorado, Washington, Oregon, Arizona) as well as for national credentialing organizations (e.g., Commission on Dietetic Registration of the American Dietetic Association, Appraisal Qualifications Board). She has extensive experience in government settings and has conducted validation studies, developed licensing and certification examinations, and/or established cut scores for over 50 professions including commercial and residential appraisers, court reporters, predoctoral and postgraduate dentists, dental auxiliaries, specialty dietitians, structural engineers, engineering geologists, environmental site assessors, fiduciaries, hydrogeologists, pest control personnel, clinical psychologists, ship pilots, pharmacists, clinical psychologists, speech-language pathologists and veterinarians. She specializes in the development of multiple-choice, performance and oral examinations and has developed innovative methods to streamline procedures for job analyses and examination development.

She has chaired and presented at the annual meetings of the Council on Licensure, Enforcement and Regulation and the National Council on Measurement in Education and has also co-authored several technical papers and journal articles. She is a member of the American Psychological Association, the American Educational Research Association, the National Council on Measurement in Education, and the Council on Licensure, Enforcement and Regulation.