

Development of the Competencies for the Future Education Model Accreditation Standards for Graduate Degree Programs in Nutrition and Dietetics



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THIS ARTICLE IS A SUMMARY OF the Accreditation Council on Education for Nutrition and Dietetics (ACEND) development of the Future Education Model (FEM) Accreditation Standards for Graduate Degree Programs in Nutrition and Dietetics. Conducted from 2013 to 2017, this initiative aimed to develop competency-based education standards that prepare entry-level registered dietitian nutritionists (RDNs) to meet evolving practice needs at least a decade into the future. Extensive background information was gathered through an environmental scan of published literature; structured interviews with health care administrators (pharmacy and nursing), deans of allied health colleges, employers in less traditional roles (communications, marketing, and management), physicians, educators in allied health graduate programs, and researchers; as well as an online survey to all Academy of Nutrition and Dietetics (Academy) members to identify anticipated future practice needs. Emerging themes underscored the increasing importance of advanced communication, research, and practitioner skills to assess and manage complex acute and chronic disease states and health of patients within the context of community and global health. Using these insights, ACEND

used a multiphase process with subject matter experts and extensive input from constituents (practitioners, educators, and employers) to develop and validate the competencies and performance indicators for the FEM graduate program. Phase I consisted of subject matter experts drafting the competencies and respective performance indicators. Phases II and III were completed using the Delphi research process to gather input from practitioners and educators on the draft competencies for defining, refining, and validating the expected level of performance. Following development, ACEND solicited significant input from the public at large with subsequent minor refinement. The final FEM Accreditation Standards for Graduate Degree Programs has 7 units that describe major focus areas of practice (foundational knowledge, client services; food systems management; community and population nutritional health; leadership, management, and organization; critical thinking, evidence-informed practice, and research; and professionalism and advocacy), 41 competencies (required knowledge, skills, and judgment) and 220 performance indicators (performance measurement criteria) that define what students enrolled in an ACEND-accredited education program must demonstrate upon graduation. The FEM Accreditation Standards for Graduate Degree Programs in Nutrition and Dietetics were released for voluntary adoption in August 2017. Subsequent sections of this article outline the work in greater depth, illustrating how each step contributed to the final standards.

HISTORICAL FOUNDATIONS OF THE MOVEMENT TOWARD GRADUATE-LEVEL RDN PREPARATION

A task force of the Academy noted in 2006 that basic educational requirements, consisting of a bachelor's degree and supervised practice, have not changed since 1927 and recommended a review of educational competencies to provide more opportunities to meet future practice needs across all degree levels.¹⁻⁴ In 2012, the Academy's Council on Future Practice (CFP) released a visioning document recommending that a greater depth of knowledge and skills is needed for future practice in the profession and that the level of educational preparation for dietitians be elevated to a graduate-level degree.⁵ At the same time, ACEND began discussions to transform the education standards to meet future practice needs. In January 2013, a joint meeting was held to plan for the future of the field of dietetics with representatives from 5 organizational units of the Academy: ACEND, the Commission on Dietetic Registration (CDR), CFP, the Education Committee of the Academy, and the Nutrition and Dietetics Educators and Preceptors (NDEP) Academy group.^{5,6} To meet future practice needs, the recommendation from the joint meeting was to elevate the educational preparation for the future entry-level RDNs to a minimum of a graduate degree and integrate both the academic coursework and supervised practice components into a seamless, 1-step program.

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ACEND ENVIRONMENTAL SCAN AND BACKGROUND DATA COLLECTION SUMMARY

During 2013-2014, the ACEND Board began exploring the skills needed for future practice and the education required to prepare students to meet these needs.⁷ An environmental scan, constituent and practitioner input via interviews and surveys, and a gap analysis of the existing curriculum were conducted to identify the future health care environment and the role of future practitioners in this environment.

Environmental Scan

The first step in the process was for an ACEND-appointed Expanded Standards Workgroup of educators, practitioners, and a public member to complete an environmental scan to identify the roles of future practitioners. The environmental scan was an extensive review of more than 100 reports and research articles and included outcomes from the Dietetics Workforce Demand Study Task Force,^{8,9} CDR's 2010 Practice Audit of entry-level registered dietitians,¹⁰ CDR's 2012 Practice Audit of recent graduates from accredited Didactic Programs in Dietetics (which described the practice of bachelor's-prepared non-RDN practitioners),¹¹ the Academy's CFP Visioning Report,¹² the Scope of Practice for the RDN, and the regulations of the Scope of Practice for the RDN.^{12,13} Future health care needs were informed by key reports such as those from the Institute of Medicine summits on safety¹⁴ and quality of health care^{15,16} and from the Lancet Commission's "Health Professions for a New Century: Transforming Education to Strengthen Health Systems in an Interdependent World."¹⁷ The environmental scan also included a review of external forces that may influence health care education, such as accreditation, degree requirements of other health care professions, national promotion programs for wellness and prevention, and reimbursement and health care payment systems.⁷ The Expanded Standards Workgroup concluded that a higher level of education is warranted to prepare the entry-level RDN for practice due to high-speed advancements in health care, technology, medicine, and food

systems; and broadening and increased complexity in public health nutrition, food safety, disease prevention, food production, and health promotion. The future knowledge and skills that were identified as needed to be added or elevated for the entry-level RDN included:⁷

- the ability to interpret clinical genetics and molecular testing;
- intensive behavior counseling skills;
- competent use of informatics skills;
- telehealth counseling skills;
- systems-thinking knowledge and experience;
- management and leadership skills at a mastery level;
- nutritional pharmacology;
- management of patients with complex medical conditions across diverse health care, community, and public health practice settings;
- marketing and communication skills for RDN brand promotion;
- coding, coverage, and reimbursement for nutrition services; and
- research skills to support and expand evidence-based practice.

Structured Interviews with Employers and Faculty

Following the environmental scan, structured interviews were conducted by ACEND to identify additional knowledge and skills needed for future practitioners beyond what the environmental scan revealed. A total of 10 structured interviews were completed with health care administrators (pharmacy and nursing), deans of allied health colleges, employers in less traditional roles (communications, marketing, and management), physicians, educators in allied health graduate programs, and researchers. The themes that emerged from the structured interviews were:⁷

- development of communication proficiency;
- greater proficiency in the ability to understand the health of patients in the context of the community and cultural ecosystem;
- greater proficiency in the ability to participate in interprofessional and interdisciplinary teams;

- greater proficiency to provide health and wellness counseling;
- greater proficiency to read, interpret, and apply scientific knowledge;
- strengthened clinical experience and clinical assessment skills;
- improved accessibility and quality of supervised practice;
- credible advanced-practice credentials to enhance the competency of practitioners to address the increasing incidence of chronic and complex diseases;
- stronger organizational leadership and project management skills to meet employer expectations; and
- greater proficiency to work in a global environment.

Survey to Constituents Querying Skills for Future Practice

Using the data gathered from the environmental scan and the structured interview results, the Expanded Standards Workgroup developed an online survey that queried the importance of 79 skills organized into 6 skill sets (professional research and practice; teamwork and communication; clinical client care; community and population health; leadership, management, and organization; and food and foodservice systems). The survey was sent to all Academy members and the Academy and dietetic practice group leadership, asking them to complete and to forward to their employers and other professionals who worked with RDNs. The survey link was also posted on the ACEND website for 60 days for the public at large comments. A total of 9477 nutrition and dietetics practitioners, educators, students and interns, employers, and other practitioners who work with RDNs responded. Most of the respondents (94.9% [n = 7928]) were RDNs, the remaining were nutrition and dietetic technicians, registered; registered nurses; medical doctors; and pharmacists. Respondents were asked to rate the importance of each of the 79 skills for future practice in nutrition and dietetics using a 4-point scale ranging from 1 = not important to 4 = very important. The importance ratings for individual skills within a skill category were averaged to give an overall mean score for each skill set

Table 1. Constituents' and employers' ratings for the importance of skill sets as essential for future employability in nutrition and dietetics^a

Skill set	Constituents ^b (n = 9470)		Employers ^c (n = 300)	
	n ^d	mean ± SD ^e	n ^d	mean ± SD ^e
Teamwork and communication	8313	3.64 ± 0.38	259	3.52 ± 0.39
Clinical client care	6267	3.46 ± 0.43	248	3.44 ± 0.44
Professional research and practice	8009	3.40 ± 0.51	262	3.25 ± 0.47
Leadership, management, and organizational	6261	3.15 ± 0.65	246	3.17 ± 0.68
Food and foodservice systems	6650	3.28 ± 0.66	243	3.11 ± 0.73
Community and population health	7033	3.33 ± 0.55	246	3.03 ± 0.66

^aResults from the Stakeholder Survey and Employer Survey, conducted in 2014.^bPracticing registered dietitian nutritionists (RDNs); nutrition and dietetics technicians, registered; employers; educators; professionals who work with RDNs; students; and interns.^cEmployers of RDNs.^dNumber of responses varies due to missing data. Response numbers derived from Table 2 in reference 7.^eScale: 1 = not important to 4 = very important to future practice in nutrition and dietetics.

category. Results suggested that all 6 skill sets were important for future practice, as they were all rated greater than 3 on the 4-point scale (Table 1). The teamwork and communication skill group received the highest mean score (3.64 ± 0.38). The leadership, management, and organizational skills group received the lowest mean score (3.15 ± 0.65).⁷

Survey of Employers Querying Skills for Future Practice

Following data collection from constituents, ACEND surveyed employers of RDNs and nutrition and dietetics technicians, registered, to determine their perspectives on the essential skills required for future practice. The employer survey included 69 of the 79 skills that received a rating >3 on a 4-point scale from the original constituents' survey. The survey was emailed to 300 employers whose names and email addresses were obtained from the previously administered constituents' survey and to the Academy dietetic practice groups leadership, requesting that they complete the survey if they were an RDN employer and forward the survey link to other employers. A total of 300 employer responses were received. Similar to the results from constituents, employers rated all 6 skill sets (professional research and practice; teamwork and

communications; clinical client cares; community and population health; leadership, management, and organization; and food and foodservice systems) as essential for future employability in nutrition and dietetics practice, with all means >3 on a 4-point scale (Table 1). The teamwork and communication skills received the highest mean score (3.52 ± 0.35), and the community and population health skills received the lowest mean score (3.03 ± 0.66).⁷

Focus Groups with Educators and Practitioners for Perceived Gaps in Accreditation Standards and Future Practice

Following the environmental scan, ACEND conducted 4 focus groups (6 to 8 participants per group) with 12 educators, 9 practitioners (several of whom were employers), and 6 preceptors to determine perceived gaps between the competencies in the 2012 ACEND accreditation standards for each program type (didactic program in dietetics, dietetic internship, coordinated programs, and dietetic technician programs) and future practice. Participants were queried with open-ended questions about perceived gaps and suggested enhancements to the competencies to determine minimum expectations of an entry-level RDN. Twenty-nine perceived gaps (Table 2)

were identified in functional domains of:

- integration of scientific information and research into practice;
- beliefs, values, and attitudes for professional practice;
- development and delivery of information, products, and services to individuals, groups, and populations; and
- foundational knowledge.

The most frequently identified gaps among all the domains were those related to critical thinking and communication skills (Table 2).

FUTURE EDUCATION MODEL DEMONSTRATION PROJECT PROPOSED

Following review of the environmental scan and subsequent data collection through interviews, surveys, and focus groups, in February 2015, the ACEND Board proposed a new model for education standards. The new model was a demonstration project called the FEM. ACEND established this title to signify the educational preparation of practitioners to meet future practice needs. Core knowledge and competencies would be identified for each degree level (associate, bachelor's, and master's), and experiential learning would be integrated into each degree program to create the structure of a seamless 1-step program for credentialing, as originally proposed through the 2012-2013 visioning process. This article describes the development of the graduate-level competencies for the RDN. The description of the development of the FEM associate and bachelor level competencies is available on the ACEND website.⁷

The FEM standards were developed following a competency-based education (CBE) model. A CBE model builds on a learner's foundational knowledge that requires them to demonstrate practice competencies aligned with future practice. The FEM standards differed from the competency statements within previous ACEND standards in that the FEM competencies define the required knowledge, skills, and judgment that students enrolled in an ACEND-accredited education program must demonstrate upon graduation rather than prescribing a

Table 2. Outcomes of focus groups (n = 4) with educators and practitioners defining the perceived gaps in competencies in the 2012 Accreditation Council for Education in Nutrition and Dietetics Accreditation Standards^a

Domain	Perceived gaps in competencies
Scientific and Evidence Base of Practice: Integration of scientific information and research into practice	• Interpretation of research and basic terms • Synthesis and analysis of information • Critical evaluation of research • Interdisciplinary research focus • Communication skills related to knowledge transfer • Use of technology (database) • Submission of institutional review board forms — graduate level
Professional Practice Expectations: Beliefs, values, attitudes and behaviors for the professional dietitian level of practice	• Cultural communications • Written and verbal communication skills • Determinants of health and diversity • Health law • Motivational interviewing
Clinical and Customer Services: Development and delivery of information, products, and services to individuals, groups, and populations	• Knowledge of medical terminology • Critical thinking and decision making • Cultural care • Industry/business competencies • Food preparation and culinary skills • Population health focus — graduate level • Supply chain management (more than just procurement) • Sustainability, recycling, and waste (aeroculture and globalization) • Medical nutrition therapy to include intervention and treatment
Support Knowledge: Knowledge underlying the requirements specified above	• Psychology • Anatomy • Epidemiology — graduate level • General management and business principles (eg, economics) • Health related ethics • Math skills • Critical thinking • Food preparation indicators

^aSource data available from reference 7.

body of knowledge that educators must teach.¹⁸ Students are expected to master competencies aligned with career-ready expectations and standards, with clear, transferable skills.^{19–26} The CBE model used to develop the FEM standards is a hybrid competency-based model because learners would be assessed on competency attainment needed for entry into professional practice while achieving academic credit required for degree attainment.²⁷ A backward curriculum design was used in which the desired learning outcomes are identified first,

followed by designing instruction and assessments aligned to the learning outcomes.²⁸ In addition, CBE incorporates performance indicators to define each competency. Performance indicators are measurement criteria to help educators determine if competence is achieved at the required proficiency level. Along with performance indicators, CBE incorporates many learning experiences that emphasize authentic learning activities and assessments, including project work and real-world activities. CBE has both formative and

summative assessments integrated into the educational program to provide students with ongoing formative feedback and to measure students' summative attainment of employability skills. These assessments lead to demonstration of readiness for entry-level practice and, at the same time, result in academic credit.²⁹ To shift programs away from reliance on knowledge testing, Miller's Pyramid of Clinical Competence was selected as the competency assessment framework. Miller's Pyramid of Clinical Competence is a clinical

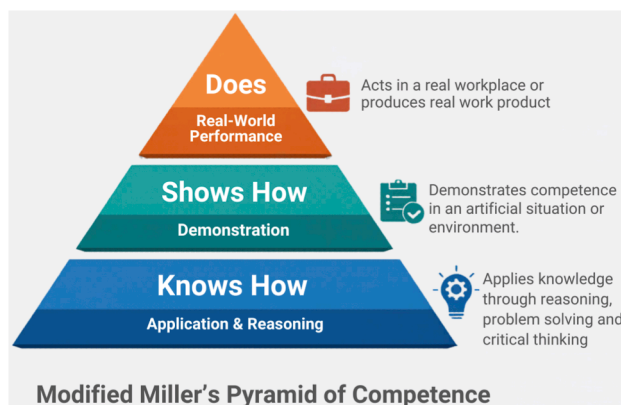


Figure 1. Adapted Miller's Pyramid of Competence³⁰ used for categorizing and assessing competence in the Future Education Model Accreditation Standards for Graduate Degree Programs in Nutrition and Dietetics.

assessment framework that aligns well with assessing the student's career-readiness, which can be evaluated at various levels of competence across didactic and supervised practice.³⁰ Per Miller's Pyramid, the basis of competence begins with cognitive competence of Knows, or knowledge and fact gathering, and Knows How, or interpretation and application. Knows level competence is assessed by traditional written exams and multiple-choice tests, and Knows How is assessed through case presentations, problem-solving activities, and essays. The competence continuum progresses to the behavior of Shows, such as demonstrating activities in an artificial environment or situation, and is assessed through role-playing, standardized patients, clinical exam, and case studies. The highest level is Does, which is demonstrated through performing activities in real work situations and environments. Recognizing that the role of RDNs extends beyond direct contact with patients, ACEND adapted Miller's Pyramid (Figure 1) to expand Miller's Does level to include authentic and real-world products that can be produced in the classroom, in a real workplace, or virtually (eg, prepare a department budget or marketing materials, plan menus and meals, conduct research, develop and present education material, and conduct a virtual assessment). The adapted Miller's Pyramid of Clinical Competence also combines the Knows and Knows How levels into 1 category of Knows and proceeds to categorize the competencies and performance indicators

into Knows, Shows, and Does (Figure 1). The rationale for combining the Knows and Knows How was based on the observation that education in health professions, including nutrition and dietetics, has shifted from only testing recall of information (at the Knows level) and observing performance (at the Shows and Does level) to incorporating a deeper learning of clinical reasoning, critical thinking, and problem-solving into the curriculum.³¹ Assigning Miller's level to the competency assists educators to incorporate summative assessments aligned to the appropriate level of knowledge (Knows/Knows How), demonstration of ability (Shows) or real-life practice (Does), and guides the selection of the appropriate assessment tool for each competency. In addition, a Miller's level is assigned to the performance indicators, measurement criteria of each competency, to ensure that the curriculum addresses each performance indicator at the required competence level. This shift to Miller's model confirms that all students in the graduate program will be offered learning activities and assessments at a level that is expected in practice upon graduation.

Competency Development for the FEM Graduate Accreditation Standards

From spring 2015 through summer 2016, ACEND completed a multiphase process to develop and validate the competencies and performance indicators for the FEM Graduate

Program.⁷ The employable skills/competencies were identified first, followed by the design of the assessment parameters, and lastly, the development of the learning activities.²⁰ The competencies and performance indicators were developed to anticipate the nutrition and dietetics practice landscape through the next 10 years (2015-2025), which included the following issues identified in the environmental scan and constituent input:

- aging patient population;
- emerging health care and wellness needs (eg, mental health, multiple and complex health needs, new diseases, and disease prevention);
- nutrition trends and emerging issues (eg, genetically modified foods, nutrigenomics, behavior modification, climate change, sustainability, and global health);
- advancements in technology;
- anticipated lack of health care professionals and workplace needs (eg, community, health care, business, and rural areas); and
- community and global health.

The development and validation of the competencies and performance indicators encompassed 3 phases. Phase I consisted of drafting the competencies and respective performance indicators. In Phases II and III, the Delphi research process was used to evaluate and refine the draft competencies and respective performance indicators. The Delphi process is a unique methodology used to systematically generate consensus by using panels of selected experts with several rounds of questionnaires to constituents to gather input on a topic. The data are aggregated and shared with the subject matter experts (SMEs) after each phase to inform decision-making and achieve group consensus on the drafts. This specific iterative process enables researchers and educators to answer critical questions that would be difficult to address with other research designs, such as experimental or quasiexperimental designs.³²

Phase I. To accomplish drafting the competencies and performance indicators for Phase I, an ACEND

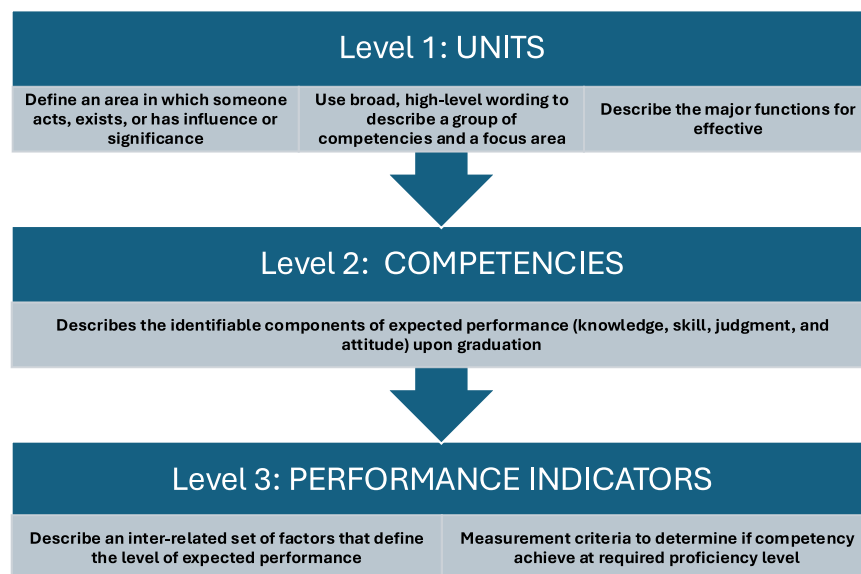


Figure 2. Framework used for competency development in the Future Education Model, Accreditation Standards for Graduate Degree Programs in Nutrition and Dietetics.

consultant with CBE expertise guided a 15-member committee of SMEs through a multistep process to develop a competency outline, write competencies and performance indicators, and ensure that each competency was set at the graduate level. The SMEs included educators and practitioners who were currently working or had worked in a broad spectrum of practice areas, including inpatient and outpatient clinical nutrition, foodservice management, school foodservice, business, communication, community nutrition, private practice, public health, educational programs, research, quality management, and health care administration.

A 3-tier functional framework of units (the highest level of the framework, representing broad, overarching areas of knowledge, skill, and judgment), competencies (the identifiable components of expected performance), and performance indicators (behaviors that define the expected level of performance) was used to develop the competencies (Figure 2). This framework organized competencies into core and transferable skills, behaviors, and attitudes across nutrition and dietetics roles, or into role-specific performance.^{27,33} The SMEs generated an initial list of units (Foundation Knowledge; Client Services Individual; Food Systems

Management; Community and Population Health Nutrition; Leadership, Management and Organization; Critical Thinking, Evidence-Informed Practice and Research; Professionalism; and Communication, Collaboration and Advocacy) to categorize the major functional areas expected of an entry-level RDN. Using information from the previously completed environmental scan⁷ and their respective work expertise and experience, the SMEs then developed the first draft of the competencies, with corresponding performance indicators for each unit. To ensure that each competency was at the graduate level, each statement was reviewed by the SMEs and, if necessary, revised to reflect deeper comprehension, greater knowledge and skill, greater independent critical thinking application, and professional judgment. The first draft of the FEM RDN competencies had 8 units with 38 competency statements and 269 performance indicators, and it was vetted with the ACEND Board before moving to subsequent phases for further input.

Phase II. Phase II in the development process involved a series of online focus groups of educators and practitioners to review the draft competencies and performance indicators created in Phase I. An invitation to participate in competency-validation

focus groups was emailed to 5000 practitioners from a random list of credentialed RDNs obtained from CDR's database. A total of 241 educators and practitioners responded and indicated interest, with 41% ($n = 98$) following through and participating in 1 of the 10 online focus group sessions. Respondents were asked to review the competencies for content (ie, missing competencies needed for initial professional practice), clarity in wording, and evaluation if at the graduate level. The focus group participants identified additional competency statements and performance indicators for entry-level practice and suggested several changes to action verbs to better reflect skills needed at the graduate level. The SMEs reviewed the focus group responses and revised the draft, resulting in 8 competency units, 41 competency statements, and 278 performance indicators. The major changes were clarifying the required competence in prescribing nutrition-related pharmacotherapy, changing conducting psychotherapy to performing psychological counseling and therapy, and merging managing global health issues with the population health-related competency. Action verbs were revised to enhance administrative functions at a higher competence level, and performance indicators were added to address the required competence for industry-related practice, including product development.

Phase III. Phase III consisted of gathering input from nutrition and dietetics practitioners, educators, employers, and professionals from outside the field of nutrition and dietetics on the revised draft competencies and performance indicators using an online survey. Participants were recruited via email from the CDR list of credentialed practitioners, professional dietetics practice groups membership, and snowball sampling. Surveys were collected from 397 individuals. The largest number of respondents were from clinical care (33.2%), with the remaining from management/leadership (17.2%), community/public health (13.6%), foodservice (7.2%), academics/research (17.4%), and other, which included students/interns and other health professionals (11.4%). Most of the respondents

Table 3. Ratings of draft competencies of the Future Education Model Accreditation Standards for Graduate Degree Programs in Nutrition and Dietetics for importance to future practice and importance to ensuring the public has access to nutrition and dietetics services from the development of the Phase III survey of constituents, and for clarity and importance to future practice and wording changes from the public-at-large-comment period

Competency	Ratings from Delphi Phase III Development ^a		Ratings from Public Comment Period ^b	
	Importance to Future Practice ^c	Importance to Public ^d	Clarity ^e	Importance to Future Practice ^f
	← Mean ± SD →			
Unit 1. Foundational Knowledge				
1.1. Applies an understanding of environmental and genetic factors in the development and management of disease. ^g	3.35 ± 0.64	3.43 ± 0.57	3.85 ± 1.20	4.06 ± 1.12
1.2. Applies an understanding of anatomy and physiology.	3.59 ± 0.57	3.60 ± 0.54	4.26 ± 1.09	4.34 ± 1.08
1.3. Applies knowledge of microbiology and food safety.	3.38 ± .058	3.36 ± 0.64	3.91 ± 1.23	4.17 ± 1.11
1.4. Integrates knowledge of chemistry and food science as it pertains to food and nutrition product development and when making modifications to food.	3.10 ± 0.70	2.98 ± 0.71	3.89 ± 1.23	4.08 ± 1.16
1.5. Demonstrates and applies knowledge of patho-physiology and biochemical functionality and their relationship to physiology (health and disease).	3.57 ± 0.60	3.57 ± 0.55	4.14 ± 1.12	4.43 ± 1.00
1.6. Applies knowledge of social, psychological, and environmental aspects of eating and food.	3.46 ± 0.62	3.30 ± 0.60	3.92 ± 1.20	4.15 ± 1.11
1.7. Integrates the principles of cultural competence within own practice and when directing services.	3.39 ± 0.67	2.36 ± 0.64	4.07 ± 1.10	4.24 ± 1.07
1.8. Applies knowledge of pharmacology and integrative and functional therapy to recommend, prescribe, and administer nutrition related therapy.	3.44 ± 0.68	3.40 ± 0.57		
1.8. Applies knowledge of pharmacology and integrative and functional nutrition to recommend, prescribe, and administer medical nutrition therapy. ^{hi}			3.73 ± 1.28	4.19 ± 1.11
1.9. Applies knowledge of math and statistics.	2.95 ± 0.76	2.68 ± 0.80	4.01 ± 1.13	4.02 ± 1.16
1.10. Applies knowledge of medical terminology when communicating with individuals, groups, and other health professionals.	3.71 ± 0.49	3.53 ± 0.56	4.23 ± 1.05	4.30 ± 1.04
1.11. Demonstrates knowledge of food preparation and techniques.	3.25 ± 0.73	3.13 ± 0.74		
1.11. Demonstrates knowledge of food preparation techniques. ^h			3.98 ± 1.21	4.06 ± 1.13
1.12. Applies technology in the decision-making process.	3.37 ± 0.67	3.28 ± 0.65		
1.12. Applies nutrition informatics in the decision-making process. ^h			3.75 ± 1.17*	4.11 ± 1.01
1.13. Integrates knowledge of nutrition and physical activity in the provision of nutrition care at all stages of the life cycle.	3.59 ± 0.52	3.48 ± 0.54	4.19 ± 1.03	4.29 ± .99
1.14. Applies knowledge of health promotion and prevention for individuals, groups, and populations.	3.52 ± 0.59	3.44 ± 0.59		

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Table 3. Ratings of draft competencies of the Future Education Model Accreditation Standards for Graduate Degree Programs in Nutrition and Dietetics for importance to future practice and importance to ensuring the public has access to nutrition and dietetics services from the development of the Phase III survey of constituents, and for clarity and importance to future practice and wording changes from the public-at-large-comment period (*continued*)

Competency	Ratings from Delphi Phase III Development ^a		Ratings from Public Comment Period ^b	
	Importance to Future Practice ^c	Importance to Public ^d	Clarity ^e	Importance to Future Practice ^f
	← Mean ± SD →			
1.14. Applies knowledge of nutritional health promotion and disease prevention for individuals, groups and populations. ^h			3.99 ± 1.21	4.35 ± 1.03
1.15. Gains a foundational knowledge on global health issues and nutrition needs.	2.95 ± 0.68	2.86 ± 0.67	3.84 ± 1.12	3.94 ± 1.13
Unit 2. Client Services				
2.1. Creates a framework to assess, develop, implement, and evaluate products, programs, or services.	3.07 ± 0.72	2.94 ± 0.72		
2.1. Uses a framework to assess, develop, implement and evaluate products, programs and services. ^h			3.77 ± 1.18	4.14 ± 1.04
2.2. Selects, develops or implements nutritional status screening tools for individuals, groups, or populations.	3.41 ± 0.61	3.35 ± 0.57	4.03 ± 1.15	4.25 ± 1.10
2.3. Utilizes the nutrition-care process with individuals, groups, or population to manage complex health needs and comprehensive systems in all practice settings.	3.60 ± 0.58	3.58 ± 0.56		
2.3. Utilizes the nutrition care process with individuals, groups, or populations in a variety of practice settings. ^h			4.10 ± 1.19	4.44 ± 1.05
2.4. Performs or coordinates nutritional interventions for all individuals, groups, and populations.	3.63 ± 0.51	3.58 ± 0.51		
2.4. Performs or coordinates nutritional interventions for individuals, groups, or populations. ^h			3.85 ± 1.32	4.30 ± 1.08
2.5. Prescribes or recommends nutrition-related drugs, supplements, and nutrition integrative and functional therapy.	3.36 ± 0.75	3.45 ± 0.69		
2.5. Prescribes or recommends nutrition-related pharmacotherapy and integrative and functional nutrition. ^{hj}			3.63 ± 1.41	3.86 ± 1.33
Unit 3. Food Systems Management				
3.1. Oversees the production and distribution of quantity and quality food products. ^k	3.01 ± .074	2.97 ± 0.72	3.97 ± 1.13	3.95 ± 1.20
3.2. Oversees the purchasing, receipt, and storage of products used in food production and services.	2.76 ± 0.83	2.79 ± 0.78	3.97 ± 1.05	3.70 ± 1.28
3.3. Applies principles of food safety and sanitation to the production and service of food.	3.21 ± 0.80	3.10 ± 0.72	3.86 ± 1.18	3.83 ± 1.24
3.4. Applies and demonstrates an understanding of agricultural practices, food technology, and processes.	2.84 ± 0.82	2.81 ± 0.76		
3.4 Applies and demonstrates an understanding of agricultural practices and processes. ^h			3.88 ± 1.16	3.72 ± 1.27

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Competency	Ratings from Delphi Phase III Development ^a		Ratings from Public Comment Period ^b	
	Importance to Future Practice ^c	Importance to Public ^d	Clarity ^e	Importance to Future Practice ^f
	←—————Mean ± SD—————→			
Unit 4. Community and Population Health Nutrition				
4.1. Assesses, plans, develops, implements, and evaluates community, population, and global programs to improve the nutritional health of vulnerable populations.	3.15 ± 0.77	3.04 ± 0.71		
4.1. Follows programming planning steps to develop and implement community, population, and global programs. ^h			3.94 ± 1.23	4.04 ± 1.13
4.2. Identifies community, population, global, environmental, and public health hazards, and participates in or coordinates the management of the situation.	2.91 ± 0.78	3.01 ± 0.73		
4.2. Identifies environmental and public health hazards that impact nutrition and participates in or coordinates the management of the situation. ^{hi}			3.86 ± 1.27	3.90 ± 1.21
4.3. Engages in legislative and regulatory activities that address community, population, and global nutrition health, and nutrition policy.	2.91 ± 0.77	2.82 ± 0.73	3.66 ± 1.38	3.74 ± 1.31
Unit 5. Leadership, Management and Organization				
5.1. Demonstrates leadership skill to guide practice.	3.53 ± 0.66	3.47 ± 0.69	3.86 ± 1.29	4.10 ± 1.15
5.2. Applies principles of organization management.	3.19 ± 0.74	3.06 ± 0.75	3.80 ± 1.40	3.93 ± 1.32
5.3. Applies project management principles to achieve the project goals and objectives.	3.15 ± 0.74	3.00 ± 0.77	4.01 ± 1.23	3.93 ± 1.22
5.4. Leads quality improvement activities to measure, evaluate, and improve programs, services, products, and initiatives.	3.25 ± 0.73	3.10 ± 0.75	4.00 ± 1.29	4.11 ± 1.19
5.5. Develops and implements risk-management strategies and programs.	2.90 ± 0.82	2.86 ± 0.82	3.74 ± 1.30	3.68 ± 1.30
Unit 6. Critical Thinking, Evidence-Informed Practice and Research				
6.1. Incorporates critical thinking skills in managing more complex situations.	3.55 ± 0.63	3.43 ± 0.70	3.94 ± 1.35	4.11 ± 1.30
6.2. Applies scientific methods utilizing ethical research practices, when reviewing, evaluating, and conducting research.	3.44 ± .067	3.30 ± 0.70	4.27 ± 1.06	4.25 ± 1.11
6.3. Applies current research and evidence-based practice to services.	3.69 ± 0.55	3.58 ± 0.58		
6.3. Applies current research and evidence-informed practice to services. ^h			4.31 ± 1.12	4.45 ± 1.05
Unit 7. Professionalism ^m				
7.1. Demonstrates ethical behaviors becoming to the profession.	3.780 ± .43	3.67 ± 0.53		

(continued on next page)

Table 3. Ratings of draft competencies of the Future Education Model Accreditation Standards for Graduate Degree Programs in Nutrition and Dietetics for importance to future practice and importance to ensuring the public has access to nutrition and dietetics services from the development of the Phase III survey of constituents, and for clarity and importance to future practice and wording changes from the public-at-large-comment period (*continued*)

Competency	Ratings from Delphi Phase III Development ^a		Ratings from Public Comment Period ^b	
	Importance to Future Practice ^c	Importance to Public ^d	Clarity ^e	Importance to Future Practice ^f
	← Mean ± SD →			
7.1. Demonstrates ethical behaviors in accordance with the professional Code of Ethics. ^h			4.30 ± .98	4.38 ± 1.03
7.2. Engages in self-reflective practice activities to develop and demonstrate social and emotional intelligence to maintain ongoing competence and professional behaviors.	3.40 ± 0.71	3.39 ± 0.64	4.10 ± 1.09	4.22 ± 1.06
7.3. Adheres to and advocates for legislation, regulations, and standards of practice.	3.49 ± 0.71	3.52 ± 0.63		
7.3 Adheres to nutrition related legislation, regulations, and standards of practice. ^h			4.30 ± 1.01	4.42 ± 0.94
Unit 8: Communication, Collaboration and Advocacy^m				
8.1. Applies effective communication skills and techniques to achieve desired goals and outcomes.	3.63 ± 0.54	3.55 ± 0.62		
8.1. Applies effective and ethical communication skills and techniques to achieve desired goals and outcomes. ^h			4.04 ± 1.30	4.18 ± 1.25
8.2. Works with and facilitates intra- and inter- professional collaboration and teamwork.	3.52 ± 0.57	3.35 ± 0.61	3.97 ± 1.40	4.14 ± 1.28
8.3. Demonstrates advocacy skills to promote awareness and required change.	3.25 ± 0.67	3.17 ± 0.71	3.86 ± 1.42	3.72 ± 1.46

^aRatings of draft competencies via an online survey (N = 397) from a broad group of interested parties, which included nutrition and dietetics practitioners, educators, employers, and professionals from outside the field of nutrition and dietetics, for importance to future practice and importance to ensuring the public has access to nutrition and dietetics services from Phase III of the development process. Source data available from reference 7.

^bRatings from interested parties (n = 88) on the draft registered dietitian nutritionist competencies during the public comment period on clarity and importance to future practice. Source data available from reference 7.

^cImportance to future practice in the profession: 1, Not important to future practice; 2, Minor importance to future practice; 3, Important for future practice; 4, Critical for future practice.

^dImportance to ensuring the public has access to competent nutrition and dietetics services: 1, Not important; 2, Minor importance; 3, Important; 4, Critically important.

^eRatings from the response to "This competency and its performance indicators are clear," 1, strongly disagree to 5, strongly agree.

^fRatings from the response to "This competency is important for future practice in nutrition and dietetics," 1, strongly disagree to 5, strongly agree.

^gTerm "genetic" is not broad enough to reflect current practice. Competency changed to "Applies an understanding of environmental and molecular factors (eg, genes, proteins, metabolites) and food in the development and management of disease."

^hRevised draft competency was presented to the public after changes that occurred during Phase III of competency development.

ⁱConcepts of pharmacology and integrative and functional nutrition should be separated. Use the National Institutes of Health term "complementary and integrative nutrition." Created 2 new competencies and modified performance indicators. C1.8 Applies knowledge of pharmacology to recommend, prescribe, and administer medical nutrition therapy. C 1.9 Applies an understanding of complementary and integrative nutrition on drugs, disease, health, and wellness.

^jToo high-level for an entry-level master prepared. Much of the integrative and functional nutrition is not evidence-based; not sure a dietitian should be prescribing this. Integrative and functional nutrition removed from this competency. Revised wording: Prescribes, recommends, and administers nutrition-related pharmacotherapy.

^k"Oversees" seems too low of a verb level. Changed to: Directs the production and distribution of quantity and quality of food products.

^lToo high-level for an entry-level master prepared. Practice sites will not allow students to do this. Competency and performance indicators deleted.

^mToo many competencies and performance indicators. Combined competency units 7 and 8 into a new unit 7 Core Professional Behaviors with 2 competencies: C 7.1 Assumes professional responsibilities to provide safe, ethical, and effective nutrition services and C 7.2 Uses effective communication, collaboration and advocacy skills.

*P < .05. Analysis of variance of ratings based on group responding (ie, program directors and practitioners).

(43.6%) had more than 20 years of experience, with 27.8% at 10 to 20 years, 21.3% at 4 to 9 years, and 21.3% and 7.3% at 3 years or less experience.

Survey respondents were asked to rate each competency and performance indicator on the perceived importance to future RDN practice

(1 = not important to future practice, 2 = minor importance to future practice, 3 = important for future practice, and 4 = critical for future practice) and

the importance to ensuring the public has access to competent nutrition and dietetics services (1 = not important, 2 = minor importance, 3 = important, and 4 = critically important). The outcomes are reported in [Table 3](#). The overall mean rating of the competencies and performance indicators for importance to future practice in the profession was 3.33 ± 0.68 , and for importance to public access to competent nutrition and dietetics services was 3.27 ± 0.66 . Nearly all the competencies were rated higher than 3 on a 4-point scale, suggesting that most of the competencies were perceived as being important to future practice and important for competence in nutrition and dietetics services. The highest rated competencies for importance to future practice were:

- Competency 1.10, Applies knowledge of medical terminology when communicating with individuals, groups, and other health professionals (3.71 ± 0.49).
- Competency 7.1, Demonstrates ethical behaviors related to the profession (3.77 ± 0.48).

The lowest rated items for importance to future practice in the profession were:

- Competency 3.4, Applies and demonstrates an understanding of agricultural practices, food technology and processes (2.84 ± 0.82).
- Competency 3.2, Oversees the purchasing, receipt and storage of products used in food production and services (2.76 ± 0.83).

The ratings for each competency and the comments on the competencies and performance indicators from the online survey were reviewed by a consensus panel, which included SME members of the Expanded Standards Workgroup, ACEND Standards Committee, and the ACEND Executive Committee. Decisions were made on the wording and inclusion or exclusion of each competency and performance indicator based on the input from the survey. The consensus panel deleted 11 performance indicators deemed redundant to other performance indicators or determined to be beyond entry-level, and modified 13 performance indicators and 1 competency to

adjust the expected competence level or clarify expectations. Terminology was adjusted throughout the document to improve consistency in the use of terms. The number of units remained at 8, and competencies remained at 41; however, the list of performance indicators was reduced from 289 to 278. Based on the ratings, the SMEs concluded that the competencies support skills for advanced leadership and research, and the ability to manage highly complex patient nutrition needs, population, and global nutrition programs and recommendations.

Public Comment Input on Draft Competencies and Performance Indicators

The final step in the development process was to solicit public input on the proposed FEM Accreditation Standards for Graduate Degree Programs in Nutrition and Dietetics, including draft competencies and performance indicators. In Fall 2016, the ACEND Board approved the release of the draft FEM Accreditation Standards for the Graduate Degree Programs in Nutrition and Dietetics for public comment. For the first call for public comment, ACEND conducted an online survey to solicit input on the clarity and ease of interpretation of each accreditation standard and its required elements, as well as the proposed competencies and performance indicators for clarity and importance to future practice. Only the feedback on the competencies and performance indicators for the RDN is included in this article.

The call for public comment was distributed to all ACEND-accredited program directors and all practitioners in the CDR database. Each was asked to complete the survey and forward the survey link to their employers and other professionals with whom they worked. In addition, the survey invitation was sent to the leaders of professional groups within the Academy (NDEP, CFP, Interoperability and Standards Committees, Nutrition Informatics Committee, Nutrition Services Payment Committee, School Nutrition Services dietetic practice group, and Consumer Protection and Licensure Subcommittee) and interested groups external to the Academy (Veterans Administration administrators and Association of

Nutrition Departments and Programs). Survey respondents were asked to rate each competency and respective performance indicators using the following statements: “this competency and its performance indicators are clear” and “this competency is important for future practice in nutrition and dietetics” using a 5-point scale (1 = strongly disagree to 5 = strongly agree) and provide any additional suggestions.

A total of 1250 individuals responded to the online public comment survey and provided input on the proposed FEM standards, with 88 (46% program directors and program faculty, 32.2% practitioners and preceptors, 4.6% employers, and the remaining identifying as students and retired faculty and preceptors) providing input on the graduate level competencies and performance indicators for the RDN. As shown in [Table 3](#), all the competencies and performance indicators were rated 3.5 or higher on a 5-point scale, suggesting that the graduate-level competencies and performance indicators were clear and were important for future practice. Analysis of variance was used to examine whether ratings differed by respondents' role (eg, program directors and practitioners). There were no significant differences in ratings of the competencies and performance indicators related to the individual's role.

The comments and corresponding changes to the competencies from the public comment period are annotated in [Table 3](#). Based on the comments received, Competency Unit 7: Professionalism Behaviors and Unit 8: Communication were combined into a revised Competency Unit 7: Core Professional Behaviors. In addition, redundant performance indicators were removed, and minor wording changes were incorporated to improve clarity. The outcome of the first call for public comments was a reduction in the number of competencies from 41 to 37 and performance indicators from 278 to 218.

A second call for public comment on the revised draft FEM Standards for Graduate Degree Programs and the associated competencies and performance indicators was solicited during spring 2017 via an online survey distributed on nutrition-related email

Unit 1: Foundational Knowledge. Applies foundational sciences to food and nutrition knowledge to meet the needs of individual, groups, and organizations
Competencies^a
1.1. Applies an understanding of environmental, molecular factors (eg, genes, proteins, metabolites) and food in the development and management of disease.
1.2. Applies an understanding of anatomy, physiology, and biochemistry.
1.3. Applies knowledge of microbiology and food safety.
1.4. Integrates knowledge of chemistry and food science as it pertains to food and nutrition product development and when making modifications to food.
1.5. Demonstrates and applies knowledge of pathophysiology and biochemistry to physiology, health, and disease.
1.6. Applies knowledge of social, psychological, and environmental aspects of eating and food.
1.7. Integrates the principles of cultural competence within own practice and when directing services.
1.8. Applies knowledge of pharmacology to recommend, prescribe, and administer medical nutrition therapy.
1.9 Applies an understanding of the impact of complementary and integrative nutrition on drugs, disease, health, and wellness.
1.10. Applies knowledge of math and statistics.
1.11. Applies knowledge of medical terminology when communicating with individuals, groups, and other health professionals.
1.12. Demonstrates knowledge of and is able manage food preparation and techniques.
1.13 Demonstrates computer skills and uses nutrition informatics in the decision-making process.
1.14. Integrates knowledge of nutrition and physical activity in the provision of nutrition care across the life cycle.
1.14. Applies knowledge of health promotion and prevention for individuals, groups, and populations.
1.15 Applies knowledge of nutritional health promotion and disease prevention for individuals, groups, and populations.
1.16. Gains a foundational knowledge on global health issues and nutritional needs.
Unit 2. Client/Patient Services. Applies and integrates client/patient-centered principles and competent nutrition and dietetics practice to ensure positive outcomes
Competencies^a
2.1. Applies a framework to assess, develop, implement and evaluate products, programs and services.
2.2. Selects, develops and/or implements nutritional status screening tools for individuals, groups, or populations.
2.3. Utilizes the nutrition-care process with individuals, groups, or population in a variety of settings.
2.4. Implements or coordinates nutritional interventions for all individuals, groups, and populations.
2.5. Prescribes, recommends, and administers s nutrition-related pharmacotherapy.
Unit 3. Food Systems Management. Applies food systems principles and management skills to ensure safe and efficient delivery of food and water
Competencies^a
3.1. Directs the production and distribution of quantity and quality food products.
3.2. Oversees the purchasing, receipt, and storage of products used in food production and services.
3.3. Applies principles of food safety and sanitation to the production and service of food.
3.4. Applies and demonstrates an understanding of agricultural practices and processes.
<i>(continued on next page)</i>

Figure 3. Registered Dietitian Nutritionist Competencies for the Future Education Model Accreditation Standards for Graduate Degree Programs in Nutrition and Dietetics released June 2017.

Unit 4. Community and Population Health Nutrition. Applies community and population nutrition health theories when providing support to community or population nutrition programs
Competencies^a
4.1. Utilizes program planning steps to develop, implement, monitor, and evaluate community and population programs.
4.2. Engages in legislative and regulatory activities that address community, population, and global nutrition health, and nutrition policy.
Unit 5. Leadership, Management and Organization. Demonstrates leadership, business, and management principles to guide practice and achieve operational goals
Competencies^a
5.1. Demonstrates leadership skill to guide practice.
5.2. Applies principles of organization management.
5.3. Applies project management principles to achieve the project goals and objectives.
5.4. Leads quality improvement activities to measure, evaluate, and improve a program's services, products and initiatives.
5.5. Develops and leads implementation of risk management strategies and programs.
Unit 6. Critical Thinking, Research and Evidence-informed Practice. Integrates evidence-informed practice, research principles, and critical thinking into practice
Competencies
6.1. Incorporates critical thinking skills in practice.
6.2. Applies scientific methods utilizing ethical research practices when reviewing, evaluating, and conducting research.
6.3. Applies current research and evidence-informed practice to services.
Unit 7. Core Professional Behaviors. Demonstrates professional behaviors and effective communication in all nutrition and dietetics interactions
Competencies
7.1. Assumes professional responsibilities to provide safe, ethical, and effective nutrition services.
7.2. Uses effective communication, collaboration, and advocacy skills.
^a Performance indicators available in reference 34.

Figure 3. (continued) Registered Dietitian Nutritionist Competencies for the Future Education Model Accreditation Standards for Graduate Degree Programs in Nutrition and Dietetics released June 2017.

lists as per the first public comment period and publicly announced at the NDEP annual conferences during spring 2017. The survey was an open-ended, free expression questionnaire requesting respondents to review and provide comments on the draft standards, competencies, and performance indicators. Respondents were also asked to provide examples of assignments and assessment types related to each competency and performance indicator, where possible.

A total of 285 individuals responded, with 57% identifying as practitioners and preceptors and 27% as program directors and faculty. The remaining 16% represented employers, professionals in

other disciplines, students/interns, and retired faculty and practitioners. As a result of the comments, revisions were made to ensure competence is achieved at the graduate level, and minor changes were made to improve clarity, including splitting 2 performance indicators. Respondents also indicated that there were too many performance indicators. To address this concern, ACEND clarified that while all competencies had to be assessed to ensure learner achievement at the defined competency level, the performance indicators, on the other hand, had to be taught in the curriculum but not assessed. The Expanded Standards Committee

reviewed the examples of assignments and assessments gathered from the second call for public comment and assigned practice expectations to inform the Miller's Pyramid level (Knows/Knows how, Shows, and Does) for each competency and performance indicator.

The final version of the FEM Accreditation Standards for Graduate Degree Programs in Nutrition and Dietetics contained 7 units, 37 competencies, and 220 performance indicators (Figure 3) and was approved by the ACEND Board and released for voluntary adoption in August 2017. Rather than requiring all programs to adopt the new standards, the ACEND

Board opted to launch the new standards through a demonstration program process.³⁴ ACEND developed an application process and a research logic model for the Demonstration Program Project to evaluate the efficacy of the FEM standards and its CBE curriculum. Programs had to apply and be approved to operate as demonstration programs following the FEM standards. Data collected from the demonstration programs would be used to guide future standards revisions and decisions. The outcomes from the FEM Demonstration Program Project will be reported in a future publication.

INFLUENCING THE FUTURE OF NUTRITION AND DIETETICS EDUCATION

ACEND developed the FEM standards with set competencies and performance indicators to meet the future practice needs of the profession of nutrition and dietetics. Strengths of the FEM standards development process include the extensive background work completed to assess future practice and the inclusion of the Delphi research process used to develop and validate the competencies and performance indicators. The Delphi process consisted of 2 rounds of data gathering via focus groups and surveys from targeted groups, followed by consensus amongst the respective SME groups. In all rounds of the Delphi process, participants and respondents represented a wide variety of nutrition and dietetics practice settings (clinical care, community/public health, government, education) and roles (clinical practitioners, educators, managers, employers, public health nutritionists). Participants held associate's, bachelor's, master's, or doctoral degrees and had been in practice from <3 years to >20 years. Practitioners from outside the profession (physicians, nurses, allied health practitioners, business and industry executives, community health workers) also provided input on the competencies needed for future nutrition and dietetics practice.

Despite the comprehensive environmental scan, extensive effort to solicit input from constituents, and reflective evaluation by experts, there may be limitations in that some skills needed for future entry-level practitioners may

have been missed. ACEND standards are not static. The standards are reviewed and revised per ACEND policy on a 5-year cycle, with additional input informing revisions to support the education required to meet future health care needs. The ACEND staff continuously documents suggestions for consideration in the revisions.

The extensive work and iterative process employed to establish the competencies and performance indicators for the FEM Accreditation Standards for Graduate Degree Programs in Nutrition and Dietetics provides a framework for the development of educational competencies. The FEM standards were introduced as a demonstration project and included an extensive program evaluation using a research logic model. Data collected from the demonstration programs are being used to evaluate the influence of the FEM Accreditation Standards and the competencies on program outcomes, employability, and job preparedness of program graduates, integrated experiential learning, competency assessment, and the marketplace need for the graduates. Findings are being used to inform decisions for future standards development and implementation.

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STATEMENT OF POTENTIAL CONFLICT OF INTEREST

No potential conflict of interest was reported by the authors.

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