Current State in U.S. Public Health Competency-Based Graduate Education

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ABSTRACT

Calls for educational transformation by education and workforce leaders, as well as both governmental and professional organizations, have been resounding in the United States over the past decade. As a result, increased recognition of outcomes or competency-based education (CBE) has evolved across health professions education and training arenas. In public health specifically, the identification and specification of competencies related to the five long-standing, discipline-based core areas of knowledge in addition to seven cross-cutting interdisciplinary domains are now required for guiding accreditation, curriculum planning, and the measurement of student achievement in both graduate and undergraduate education. Nevertheless, full realization of CBE for potentially enhancing current educational practices, including both learning and assessment methodologies, remains in the early stages of adoption and curricular integration in both public health graduate education and the health professions at-large.

This article provides an overview of the influences that have led to the consideration and development of strategies for promoting outcomes-based educational performance and accountability across post-secondary higher education in the US; evolving CBE pedagogy in public health graduate education; and experiences to date regarding success factors, barriers, and challenges encountered with the implementation of competency-based education. Recommendations for furthering educational transformation in public health are also discussed.

Key Words: Public health, educational competencies, outcomes-based education, health professions competencies, graduate education competencies

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"…The labour market for health professionals is often characterized by multiple imbalances, the most important of which are undersupply, unemployment, and underemployment,which can be quantitative (less than full-time work) or qualitative (suboptimum use of skills). To avoid these imbalances, the educational system must respond to the requirements of the health system."

Julio Frenk, et al[1]

INTRODUCTION

Competency-based education (CBE) has increasingly become a mainstay across health professions education and training arenas in the United States during the past decade. Its use in public health graduate education specifically continues to expand due to calls for educational transformation across the professions by education and workforce leaders, as well as by governmental and professional organizations. Related mandates by concerned accrediting bodies have led to the development of a number of competency models to guide health professions educational reform. However, it is widely recognized that less effort, reflection, and research have been committed to diffusion, integration, and utilization of these models—as well as CBE—in specific curricular applications. Hence, the full realization of CBE for potentially enhancing educational practices across the professions remains in the earliest stages of adoption and curricular integration in both public health graduate education and the health professions at large.

This article provides an overview of:

1. the forces that have led to the consideration and development of strategies for promoting outcomes-based educational performance and accountability across post-secondary higher education in the US;
2. evolving CBE pedagogy in public health graduate education; and
3. experiences to date regarding success factors, barriers, and challenges encountered during the implementation of CBE.

In addition, recommendations for furthering educational transformation in public health are also discussed.

THE CALL FOR COMPETENCY-BASED EDUCATION

During the past decade there has been an increase in the recognition of CBE and testing as well as greater use of competency models for shaping higher education curricula in the US.[2] The motivation for transforming higher education was initiated in part by the U.S. Department of Education's

(DOE) calls for a more highly educated and prepared workforce. In 2005, then US Secretary of Education Margaret Spellings introduced a new Commission on the Future of Higher Education which was charged with creating a comprehensive plan for reforming higher education that would: 1) meet the needs of America's students, and 2) address the imperatives for America's continued economic and workforce development.[3] The Commission was comprised not only of university presidents, policy-makers, and educational researchers, but also CEOs from various industry sectors, with the intent to engage the business community in collaborative educational reform. The introduction of diverse participants to this task represented a shift in the focus of higher education from knowledge-based, passive learning to a collective resolve to create a skilled, competent, and globally competitive workforce.

Subsequent Commission reports and issue papers focused on: specific recommendations for revolutionizing the higher education system from prior emphasis on intangible institutional reputation to one based on performance and meaningful student outcomes (Table 1)[4]; educational transparency, accountability, and change strategies[5]; projected shortages of health care workers over the next couple of decades[6]; and the failure of professional schools in teaching the skills of the 21st century to prepare professionals for the labor market.[7-13] In late 2006 a DOE accreditation forum was held to introduce the resulting recommendations to key stake-holders and to explore implementation strategies, with the burden of responsibility for supporting the transformation of the US higher education system being placed on the accrediting organizations.[5]

Similarly, during the past decade, the US Institute of Medicine (IOM) called upon institutions of higher education to not only increase the number of health professions graduates, but also to elevate graduates' knowledge, skills, and other personal characteristics needed for meeting the ever-changing health care field. In the third installment of their health care quality initiative reports, "Health Professions Education: A Bridge to Quality,"[14] the IOM also challenged the effectiveness of the current education system and made recommendations for advancing the ten rules envisioned by the "Crossing the Quality Chasm" report (Table 2).[15] Specifically, the IOM detailed five core competencies needed across the health professions, expressed through a vision to be shared by all institutions of health professions education: "All health professionals should be educated to deliver patient-centered care as members of an interdisciplinary team, emphasizing evidence-based practice, improvement approaches, and informatics." The IOM also encouraged educational accrediting agencies to expand from a "descriptive" review and assessment model focused on

structure and procedures to one that includes evaluation of the institutions based on student-centered outcomes.[15] The pedagogical principles related to this vision are applicable to public health education as well as for preparing clinical providers across the health professions.

Table 1

2006 Commission on the Future of Higher Education:
Recommendations for Reforming U.S. Higher Education

Key Recommendations	Other Proposals
1. The US must commit to an unprecedented effort to expand higher education access and success by improving student preparation and persistence, addressing nonacademic barriers and providing significant increases in aid to low-income students.	Public providers of student financial aid should commit to meeting the needs of students from low-income families.
2. The entire student financial aid system must be restricted and new incentives put in place to improve the measurement and management of costs and institutional productivity.	Policymakers and higher education leaders should develop, at the institutional level, new and innovative means to control costs, improve productivity, and increase the supply of higher education.
3. Higher education must change from a system primarily based on reputation to one based on performance. A robust culture of accountability and transparency throughout higher education must be created.	Create a consumer-friendly information database on higher education with useful, reliable information on institutions, coupled with a search engine to enable students, parents, policy-makers and others to weigh and rank comparative institutional performance.
4. US colleges and universities must embrace a culture of continuous innovation and quality improvement by developing new pedagogies, curricula, and technologies to improve learning, particularly in the area of science and mathematical literacy.	Provide more and better information on the quality and cost of higher education to policy-makers, researchers and the general public.
5. A national strategy for lifelong learning must be developed that helps all citizens understand the importance of preparing for and participating in higher education throughout their lives.	Postsecondary education institutions should measure and report meaningful student learning outcomes.
6. Increased federal investment in areas critical to our nation's global competitiveness and a renewed commitment to attract the best and brightest minds from across the nation and around the world to lead the next wave of American innovation.	

Source: Adapted from U.S. Department of Education. (2006). "A test of leadership: Charting the future of U.S. higher education." A report from the Commission on the Future of Higher Education, Washington, DC.[4]

Table 2

Institute of Medicine – Rules for Health Care Redesign and Improvement

1. Care based on continuous healing relationships
2. Customization based on patient needs and values
3. The patient as the source of control
4. Shared knowledge and the free flow of information
5. Evidence-based decision making
6. Safety as a system property
7. The need for transparency
8. Anticipation of needs
9. Continuous decrease in waste
10. Cooperation among clinicians

Source: Adapted from Institute of Medicine's Crossing the Quality Chasm, 2003.[15]

THE RESPONSE TO DATE

US accrediting agencies for health professions education programs have responded to these calls from the DOE and IOM regarding outcomes-based education, as reflected by the current changes in required accreditation standards and processes. The major accrediting organizations for dentistry, health care management, medicine, nursing, pharmacy, and public health currently all require that specific competencies or learning objectives be achieved through accredited curriculum, or alternately require individual programs to develop, implement, and document their own individualized competency model (Table 3).[16-23]

In conjunction with evolving U.S. accreditation standards and directives, there has been a growing recognition of the need for change from discipline-specific or content-centric "learning objectives" in favor of student-centered and performance-based "competencies" across all educational arenas. Although there are a number of slightly different definitions, a "competency" is generally viewed as encompassing the full array of knowledge, skills, attitudes, and other characteristics (KSAOs) for completing a task or course of study or performing a job, rather than simply knowledge alone.[24-26] In its current Accreditation Standards, the Council on Education for Public Health (CEPH)—the independent agency which accredits public health schools and programs—continues to require curriculum content and coursework based on the five long-established core areas of public health knowledge (biostatistics, epidemiology, environmental health sciences,

health services administration, and social and behavior sciences).[17] Like most current accrediting body standards, CEPH does not outline a standardized list of competencies required for public health professionals graduating from accredited programs and institutions. Instead, the "Required Competencies" Standard 2.6 for public health schools and programs stresses the importance of the required competencies related to the core knowledge areas for both guiding curriculum planning processes and serving as the primary measures against which student achievement is measured. In addition, these standards emphasize the need for explicit articulation of course competencies and the learning objectives—"the incremental learning experiences at the course and experiential levels that lead to the development of the competencies," and their alignment with the school's mission, goals, and objectives.[17,25]

In its revised accreditation criteria for Fall 2013, the Commission on Accreditation of Healthcare Management Education (CAHME) similarly outlines core curricular content or subject matter in relation to a specific knowledge area—the health care system and health care management, in addition to four major competency domains, including: communication and interpersonal effectiveness; critical thinking, analysis, and problem-solving; management and leadership; and professionalism and ethics.[20] The Commission also requires programs to base their curricula and outcomes assessments on existing evidence-based core competency models, or their own scientifically-derived model. CAHME avoids prescribing a standardized model for its accredited programs in order to create an opportunity for the practicing community to jointly partner with educational programs in producing the future generation of competent professionals.[27]

In response to the calls for enhanced graduate education and better alignment with career pathways, competency models are increasingly being developed across the health professions.[28] The Association of Schools of Public Health (ASPH) embarked upon several competency and learning outcomes development projects to: 1) respond to CEPH's evolving accrediting processes in 2005, and 2) facilitate the incorporation and utilization of standard core competencies in curriculum planning and development (Table 4). A number of these current models have been supported by the US Centers for Disease Control and Prevention (CDC).[29-32]

Due to these nation-wide competency modeling initiatives, higher education programs for health professionals are now positioned to respond to the evolving shift to CBE. With the support of DOE, the IOM, the CDC, and the accrediting groups, necessary structural frameworks and competency specification initiatives have been established to encourage and further advance the utilization of CBE across the health professions.

Synopsis of Health Care Professions Accrediting Standards Regarding Learning Outcomes

Accrediting Body	Profession	Targeted Programs	Domains, Competencies and/or Other Learning Outcomes	Prescribed or Required Assessment
Accreditation Council for Graduate Medical Education (ACGME)	Medicine	Specialty and sub-specialty medical residency programs	Six domains with 24 competencies	Residents will be regularly evaluated on the six competencies, eventually achieving the expected level of a new practitioner.[16]
Accreditation Council for Pharmacy Education (ACPE)	Pharmacy	Doctor of Pharmacy degree programs	Three professional competencies, eleven other "knowledge, skills, attitudes, and values," and two sub-competencies (Standard 12.1)	As a component of its evaluation plan, the college or school must develop and carry out assessment activities to collect information about the attainment of desired student learning outcomes. (Standard 15)[23]
Commission on Accreditation Health-care Management Education (CAHME)	Healthcare Management	Healthcare management education programs	No defined competencies or student learning outcomes; one knowledge area and four competency domains	The Program will ensure that course syllabi incorporate current developments in the field and accurately reflect course competencies and content, teaching and assessment methods and relationship to other courses.[20]
Commission on Collegiate Nursing Education (CCNE)	Nursing	Baccalaureate and post-baccalaureate nursing programs	No defined competencies; aggregate and individual student learning outcomes	Aggregate student outcomes data (not applicable to new programs without graduates), including: Student, alumni, and employer satisfaction for each program; Graduation rates for each program; NCLEX-RN® pass rates; Certification examination pass rates by specialty; Employment rates for each program; Other aggregate data, as appropriate (Standard IV)[19]

Accrediting Body	Profession	Targeted Programs	Domains, Competencies and/or Other Learning Outcomes	Prescribed or Required Assessment
Commission on Dental Accreditation (CDA)	Dentistry	Doctor of Dental Surgery and Doctor of Dental Medicine degree programs	Seven domains ("competencies" and curriculum management listed together within the domains) (Standards 2-9 to 2-25)	The dental education program must employ student evaluation methods that measure its defined competencies. (Standard 2-5)[21]
Council on Education for Public Health (CEPH)	Public Health	Baccalaureate and post-baccalaureate public health programs	Five domains (competencies to be defined by school) (Standard 2.3)	There shall be procedures for assessing and documenting the extent to which each student has demonstrated competence in the required areas of performance. (Standard 2.7)[17]
Liaison Committee on Medical Education (LCME)	Medicine	Medical Doctor degree programs	Educational objectives (to be defined by school) (Standard II.A)	A faculty committee of a medical education program must be responsible for monitoring the curriculum, including the content taught in each discipline, so that the program's educational objectives will be achieved. (Standard ED-37)[22]
National League for Nursing Accrediting Commission (NLNAC)	Nursing	Associate, Baccalaureate, and Post-Baccalaureate nursing degree programs, and Diploma and Practical Nursing programs	No defined competencies or student learning outcomes	The systematic plan for evaluation emphasizes the ongoing assessment and evaluation of the student learning and program outcomes of the nursing education unit and NLNAC standards.[18]

Table 4

Current ASPH Competency Models

Model	Status
Master of Public Health Core Competency[29]	Released 2006
DrPH Core Competency[30]	Released 2009
Public Health Preparedness & Response Core Competency[31]	Released 2010
Global Health Competency[32]	In development
Undergraduate Public Health Learning Outcomes[32]	In development
Master's-Level Preparedness & Response Competency[32]	In development
Cultural Competence Education for Students in Medicine & Public Health[32]	In development

CURRENT LEVELS OF COMPETENCY-BASED EDUCATION INTEGRATION

Rogers' framework for the diffusion of educational innovations is a noteworthy model for pinpointing the extent to which CBE has been disseminated through the field of education.[33] This framework proposes three phases of innovation diffusion:

Phase I – Awareness and Debate;

Phase II – Evaluation and Trial; and

Phase III – Adoption and Diffusion.

Rogers also identifies five groups of implementers, in a sequential order for adopting an innovation: *innovators, early adopters, early majority, late majority,* and *laggards.* Integration of CBE at the majority of universities and colleges, as well as the health professions—including public health graduate education—is in the earliest phase of adoption. However, the early development stage is constrained by the current lack of faculty familiarity with CBE learning and assessment principles, methods, and related research history, in addition to ongoing debates regarding the merits and evidence underlying competency related approaches. Other schools and programs—and individuals—who have sought out additional evidence-based educational research, explored potential CBE deployment strategies, and used CBE principles in their classes would be considered *innovators* or *early adopters*. They have progressed beyond the Awareness Development and Debate stage and are currently involved in early to advanced CBE

deployment initiatives and evaluative activities for continued refinement in their teaching practices; thereby comprising the current minority of *early adopters*.


Fig. 1. NCHL Health Leadership Competency Model.

> **Source:** Adapted from National Council for Healthcare Leadership. URL: http://www.nchl.org/static.asp?path=2852,3238 (Accessed 2 September, 2011).

To date, only two known studies have examined the extent of CBE incorporation in public health schools and other programs.[34,35] The National Center for Healthcare Leadership (NCHL) conducted a nation-wide demonstration project to provide evidence-based improvement processes for enhancing integration and utilization of competency-based learning and assessment in US graduate health management programs.[34] Ten CAHME-accredited programs were selected for the study from a national pool to determine competency-based strengths and weaknesses in the core health services management curriculum across programs. Six of these programs were in schools of public health.[34] Subsequent review and analysis of the curricula when mapped to the NCHL Competency Model (Figure 1) by demonstration project leaders revealed that competency strengths, weakness, and gaps were similar across the ten sites. Strengths were found in relation to key competencies, including Innovative Thinking, Organizational Awareness, and Strategic Organization competencies in nine of the ten programs. In contrast, gaps were evident in relation to

Financial Skills, Impact and Influence, Process Management and Organizational Design, and Project Management competencies at eight of the ten participating programs.

Analyses across the NCHL demonstration sites also revealed that the teaching and learning activities were predominantly focused on lower retention and faculty-driven activities, rather than the recommended higher retention, career-like activities based on active learning principles.[34] Additionally, there was a notably high dominance of cognitive ("thinking") learning objectives compared to affective ("feeling") behavioral learning objectives, as defined by Bloom's Taxonomy of Educational Objectives.[36] As widely noted throughout the literature on leadership development, affective behaviors are equally critical for long-term career success. If not learned or developed during formal educational experiences, one's career advancement can be significantly compromised or stalled due to the lack of these skills.[37,38] As depicted in Figure 2, one's knowledge is only the "tip of the iceberg. The less concrete—and often more difficult to measure— behavioral capabilities, personal attitudes, values, and other characteristics below the analogous and less observable "waterline" are most often key predictors of longer-term success in the workplace.
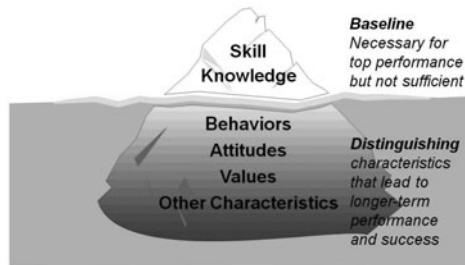
Fig. 2. Key Competencies for Career Success.

Source: Adapted from the HayGroup Model derived from and Spencer LM & Spencer SM, 1993[37] Spencer LM, McClelland DC & Spencer SM[38]; 1994.

The NCHL baseline curricular investigation allowed each of the ten participating sites to develop a detailed CBE curriculum and a related improvement plan. Each demonstration site subsequently generated strategies to address identified curricular gaps and areas for improved educational practice—including both knowledge-based cognitive skills and behavioral competencies—prior to their program-specific two-year implementation and evaluation of a comprehensive, model-driven CBE curriculum.[34]

In the second study specific to schools of public health, the researchers and their colleagues conducted a survey of 40 schools of public health to determine the levels of awareness, adoption, and integration of competencies into curricula.[35] The survey assessed faculty and student reactions to the ASPH Master of Public Health Competency Model, as well as the schools' approaches to CBE curricular change and the extent of implementation. The results revealed a variance among schools regarding introduction and utilization of the model, with only 44 percent of survey respondents having fully mapped competencies to program curricula for determining areas of concentration and gaps in relation to each of the competencies in the model. The survey results also revealed three key barriers to the implementation of the model in schools of public health: low faculty interest (48%); lack of awareness and understanding of CBE principles throughout the school (36%); and insufficient time to deploy and assess CBE methods and change endeavors (39%).[35]

From these studies, as well as wide recognition across public health educators, it is clear that the diffusion of CBE in public health graduate education remains on the cusp of Phase II of diffusion. The *innovators and early adopters* of this educational transition in public health—like other educational leaders across the professions—have already moved beyond debate and familiarization (Phase I) with the related principles and benefits. They are currently actively engaged in the identification and specification of core competencies critical to their graduates' career success, the actual deployment (trial) of competency-based learning and assessment methods, and the evaluation of the related outcomes from their revised educational practices.[17,34] Their evaluation findings and feedback as well as their expertise, will be invaluable to later adopters and the ultimate diffusion of CBE throughout the field of education and learning.

LESSONS LEARNED AND ANTICIPATED CHALLENGES

The national demonstration project conducted by NCHL, as outlined above, offers several lessons. First, a number of barriers were identified which were common across programs related to implementing CBE. Primarily, the lack of familiarity and experience with competency-based learning and assessment methods among faculty proved a great hindrance to the success of implementation. Despite the past decades of educational research supporting outcomes-based education,[13,36-42] faculty still often debate the features, structure, and benefits of the selected competency model. This disagreement and criticism was frequently coupled with conceptual

misunderstandings about the selected model, leading to compromised curricular integration. Another typical barrier was the time commitment for implementation, including the time required to develop a competency model and for restructuring course curricula to include essential adult learning principles for advancing CBE (i.e., team-based applied and integrative learning opportunities). Other barriers were similar to those experienced with the implementation of innovations in academia in general: lack of faculty awareness of pedagogical and evaluation best practices and the supporting evidence; project "champion" turnover; inadequate faculty participation incentives; competing priorities; and overall resistance to change. [43]

One of the key factors these programs found beneficial in their pursuit of CBE was the use of a common competency model. Without clearly specified and behaviorally-based standards for specific programs or degrees, a great deal of uniqueness and variability arises not only across courses within a program, but also across programs and degree offerings within a school. While all schools like to promote their unique and differentiated programs, future employers continue to lobby for a core set of uniform skill sets that they can expect new graduates with specific degrees to bring to the workplace upon career entry.

DISCUSSION AND SUMMARY

Debate and challenges regarding CBE continue today in a number of post-secondary educational settings, including schools of public health. As a result, many schools and programs continue to base their curricula primarily on discipline-specific knowledge transfer and infrastructure accreditation standards. However, growing support by educational leaders and researchers, workforce improvement advocates, and professional accrediting organizations remain committed to documented and accountable performance-based education directed by specified competencies articulated with the core knowledge areas and related learning objectives.

A number of key questions remain to advance beyond the debate and trial stages to field-wide adoption and integration of CBE. First, how will CBE and other pedagogical principles be used to further spur the movement forward? How do public health educational programs move beyond the dominance of knowledge-based curricula? How will action-based and career-like learning and assessment experiences that better prepare public health students for their roles upon entry into their respective specializations be incorporated? How will best practices in evaluation be incorporated to

support the competency-based methods? How will the current cohorts who graduate with faculty-emphasized theoretical and analytical thinking gain the communication, collaboration, community and global orientation, and strategic planning skills for enhanced leadership in the field? All of these "how to's" are critical to both optimal learner career entry and long-term success in their selected career roles and professional fields.

During the early introductory stages (Phase I – Awareness and Debate), six key issues and/or barriers to the dissemination of competency-based learning are frequently addressed in the literature, including:

1. conflicting terminology and prevalence of educational jargon;
2. lack of consensus on or value for the approach—most often due to lack of faculty familiarity with the decades of educational research supporting current best practices in both graduate level learning and assessment methods;
3. related cost and time requirements;
4. deficiencies in the understanding of CBE and methodological deployment "know how";
5. evolving assessment mechanisms and defensibility; and
6. new framework development versus adoption.[26]

Although variability in and confusion regarding the CBE lexicon still exists today, this issue has abated somewhat over the past decade of educational innovation with the increasing related body of work and research in the field, as well as the proliferation of competency models across the health professions at-large and public health specifically. The resulting definition and specification of educational standards for both student learning and related assessment techniques has also contributed to increased understanding and consensus. Establishing a common set of performance goals and metrics for workforce requirements greatly enhances the process of evaluation. In addition, as more schools prepare for their next accreditation reviews and adopt or develop the mandated competencies for their curricula, the benefits of CBE are gaining increased recognition.

Nevertheless, the above challenges and barriers remain today, further intensified by the continuing demands on and conflicting priorities for faculty members. Leaders in schools of public health still view the use of CBE practices as expensive in relation to the financial investments required for deployment of the related practices, as well as for initial faculty buy-in and ongoing involvement. In addition many faculty members continue to see the newer CBE educational methods as complicated, time-consuming, and too often requiring new ways of thinking about their courses and related instructional and evaluation methods. Few faculty members are

formally educated or trained in either the art or science of teaching. As a result, they establish their courses and teaching methods based on the way they were taught, with lectures and the writing of papers remaining dominant teaching methods—both of which do not represent the types of educational best practices or newer learning technologies that students will experience in their future work roles.[13,14,34]

Key to any educational change initiative will be enhancement of faculty skill and comfort levels with adult learning and competency-based principles and methods for optimal deployment in graduate school settings. As noted in the IOM Bridge to Quality report,[14] methodological advancement in higher education will require moving beyond traditional passive learning with faculty-centric, lecture-based, knowledge transfer and theoretical discussions, as well as the dominance of reliance on written papers for assessing knowledge and analytical achievement. Instead, applied and integrative (AIL) learning methods related to high-impact adult learning principles, such as those endorsed by the Association of American Colleges and Universities, will need to be increasingly endorsed and utilized.[14,28,44]

Based on the results of investigative efforts conducted throughout the past century of educational research, action-oriented, team-based experiential, and reflective methodologies have been shown to be highly effective for impacting learning outcomes, long-term retention, and performance.[28,36-42] These methods have been progressively deployed throughout all levels of US education from primary to postsecondary education. Thus, future graduate students will have long histories of educational experiences that are grounded in CBE and associated applied and integrative learning principles and practices. For optimal educational outcomes, graduate level learning and assessment methods, such as those provided below for illustration, will need to build on these entering skills, associated learning styles, and pedagogical practices:

- inclusion of future career-like simulations and field experiences that graduates will be facing immediately upon career entry (i.e., experiential community and workplace-specific projects);
- tailoring of learning to individual career pathways, goals, and needs (i.e., individual performance/leadership plans);
- alignment of educational methods with higher-order taxonomic educational outcomes (application, analysis, synthesis/creation, and evaluation) versus lower-level knowledge and comprehension, instructional goals and objectives;

- outcome-specific recording and review of student learning experiences for highlighting cumulative skills and on-going mentoring (i.e., educational portfolios);
- promotion of inter-disciplinary, team-oriented learning and professional development interactions (i.e., case-based problem-solving, immersion in field-specific experiential projects); and
- provision for on-going reflective evaluation processes, such as criterion-based self, peer, and team assessments that are foundational for personal and team-based continual performance improvement skills.

In addition to be being "thinkers and analysts," graduates will need to be able "to do"—to actively apply their knowledge in relation to creating and synthesizing solutions and evaluating a full array of the evolving professional situations and challenges they will face following graduation. Due to rapidly changing national and world economies, employers no longer have the resources for or the interest in training graduates for their immediate roles.[11,12] Hence, they are placing higher employment priorities on those graduates with more relevant skill sets who can enter the workforce better prepared to quickly contribute to the efficiency and productivity of the workplace beginning on day one.[11-13]

Finally, investment in ongoing faculty development and educational program advancement will have to be ongoing. Although essential and valuable for introducing the theory and mechanics—the "how to's"—of CBE, even highly effective and intensive "boot camp" introductory immersions provide only short-term solutions when offered one-time. In line with evolving accreditation standards, faculty CBE teaching and evaluation skill development sessions and orientations will need to be regularly provided, assessed, and documented over time for both current and new faculty. This will require consideration of the costs associated with "make or buy" alternatives regarding ongoing faculty pedagogical development. Recognized educational specialists and experts—most often external to the school—have been found to more effectively and efficiently move faculty through the early stages of CBE (awareness and trial). Intra-institutional education discipline experts and/or campus-wide educational development professionals can then be enlisted to increase faculty knowledge, specific skill sets, and comfort in using competency-based learning and assessment methods.

CONCLUSION

If future public health workforce leadership is truly going to be prepared in response to community and global labor market needs and expectations as addressed by Julio Frenk and his colleagues,[1] graduate education has to evolve beyond the historical focus on faculty-specified course content and traditional lecture-based teaching and memorization evaluation methods.[1,11,12,14,15,40-42] Essential learning outcomes and career-entry skills or competencies—beyond what graduates "know" and can "analyze"—need to be clearly specified and behaviorally operationalized in relation to what they can "do" for the advancement of their future work settings. Transformation in educational methods and experiences will also have to be aligned with the social, political, technological and economic changes in the health care environments both within the US and globally. Hence, as applicable to the other health professions, the newer learning and evaluation methods and technologies that optimize student-centered CBE outcomes should be developed, deployed, and regularly assessed for their relevance and contributions by accountable faculty in public health education. In addition, faculty will need to be formally prepared for both the adoption and diffusion of performance-based educational methodologies and best practices in the evaluation of related outcomes. Finally, the teaching mission should be both promoted and supported for continual process improvement and excellence in line with the current level of recognition and focus on the research and service missions of postsecondary education. Commensurate emphasis on documented best-practices in all three of the traditional missions in graduate education is critical to the development of future leaders in public health and the advancement of the field.

Acronyms List
ASPH = Association of Schools of Public Health
CAHME = Commission on Accreditation of Healthcare Management Education
CBE = Competency-based education
CDC = US Centers for Disease Control and Prevention
CEPH = Council on Education for Public Health
DOE = US Department of Education
IOM = US Institute of Medicine
NCHL = The National Center for Healthcare Leadership

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