

The Dental Education Environment

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Abstract: The second in a series of perspectives from the ADEA Commission on Change and Innovation in Dental Education (CCI), this article presents the CCI's view of the dental education environment necessary for effective change. The article states that the CCI's purpose is related to leading and building consensus in the dental community to foster a continuous process of innovative change in the education of general dentists. Principles proposed by CCI to shape the dental education environment are described; these are critical thinking, lifelong learning, humanistic environment, scientific discovery and integration of knowledge, evidence-based oral health care, assessment, faculty development, and the health care team. The article also describes influences external to the academic dental institutions that are important for change and argues that meaningful and long-lasting change must be systemic in nature. The CCI is ADEA's primary means to engage all stakeholders for the purpose of educating lifelong learners to provide evidence-based care to meet the needs of society.

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In the September 2006 *Journal of Dental Education*, the American Dental Education Association (ADEA)'s Commission on Change and Innovation in Dental Education (CCI) published a Perspectives article on "the case for change."¹ In the same issue, the CCI issued a white paper on educational strategies associated with the development of problem-solving, critical thinking, and self-directed learning.² In October 2006, the CCI released a draft of "Competencies for the New General Dentist," with a call for comments from ADEA members.³ These competencies, when completed based on input from a variety of stakeholders, will serve as a benchmark

for dental schools, National Boards, and accreditation standards for curriculum design, designation of knowledge and skills to be mastered by dental students, and construction of assessments to measure acquisition of entry-level general dentistry skills. In this Perspectives article, the CCI delineates its vision, its values, and the principles it considers essential to frame the kind of dental education environment of the future that will allow dental students to acquire the competency needed to serve the oral health needs of the public.

The CCI's purpose is to build consensus within the dental community by providing leadership and

oversight to a systemic, collaborative, and continuous process of innovative change in the education of general dentists so that they enter the profession competent to meet the oral health needs of the public throughout the twenty-first century and to function as an important member of an efficient and effective health care team. The CCI recognizes that a variety of factors influence the curriculum at each dental school. Among these factors are expectations of the parent institution, standing or emerging research foci, strengths among specialty education programs, approaches to clinical education, and pedagogical philosophies and practices. All U.S. dental schools are fully accredited by the Commission on Dental Accreditation. The accreditation process recognizes legitimate differences among schools in the priority they place on biomedical, clinical, and behavioral sciences. While the CCI holds that diversity of curricula is a strength, the commission believes that certain principles create the best environment for change and innovation.

Principles to Shape the Dental Education Environment

Professions exist to serve the needs of society, communities, and individuals who become patients or clients in a variety of settings. The dental profession's continuing service to society is safeguarded by academic dental institutions that recruit, educate, and develop the future members of the profession: practitioners, educators, researchers, administrators, and the leaders of organized dentistry. If dental educators are to meet these purposes, change and innovation in dental education must be responsive to evolving societal needs, practice patterns, scientific developments, and economic conditions. Academic dental institutions must prepare students to enter the practice of dentistry as professionals, informed citizens, and enlightened leaders in a changing health care system.

The most serious issue facing health care today, including oral health care, is providing care for an increasing population of unserved, underserved, and uninsured patients who lack access to oral health care and face rising health care costs. At the same time, scientific advances, particularly in genetics and molecular biology, presage the emergence of new modalities of patient care. These two issues under-

score not only the importance of basic biomedical and clinical sciences in the curriculum, but also the place of economics, social sciences, and ethics. In becoming professionals, students must learn to think about a wide variety of issues to which the profession is responsible and to act for the good of society and a broad diversity of individuals who will likely become their patients. Thus, dental curricula must emphasize the acquisition of relevant knowledge, inculcate values and attitudes, and develop learning skills that will be used throughout the professional lives of its graduates. The CCI holds that the following principles should characterize the educational environment and inform dental curricula.

Critical Thinking: Cornerstone of the Dental Education Experience

Critical thinking is the one thread that weaves together the many complex educational experiences of students. Through a process of integration, reflection, and examination and analysis, students develop foundations for curiosity, an understanding of the value of science as it applies to clinical practice, and the desire and motivation for lifelong learning to contribute to the profession's place in society and its standing in the health care team.

Critical thinking is "the intellectually disciplined process of actively and skillfully conceptualizing, applying, analyzing, synthesizing, and/or evaluating information gathered from, or generated by, observation, experience, reflection, reasoning, or communication, as a guide to belief and action."⁴ Because critical thinking involves a special way of gathering and considering information and responding, it is different from the mere acquisition of information or possession of a set of skills. Scriven and Paul describe the mature critical thinker as one who:

- raises vital questions and problems, formulating them clearly and precisely;
- gathers and assesses relevant information, using abstract ideas to interpret it effectively and come to well-reasoned conclusions and solutions, testing them against evidence, criteria, and standards;
- thinks with an open mind within alternative systems of thought, recognizing and assessing assumptions, implications, and consequences; and
- communicates effectively with others in determining solutions to complex problems.⁴

Critical thinking is foundational to teaching and learning any subject. An educational environment characterized by the discipline of critical thinking de-

velops self-directed, self-disciplined, self-aware, and self-corrective learners. Dental faculty must model critical thinking not only in their pedagogy—what and how they teach—but also in their learning. With critical thinking as a guiding theme, the CCI proposes these additional principles for the continuous process of curriculum renewal in dental education.

Lifelong and Self-Directed Learning

Traditionally, dental curricula have been constructed so that students learn all current scientific and clinical content during dental school. Over time, with new discoveries and applications, students must work harder, faster, and longer if they do not want to neglect content deemed important by the faculty. Combine this situation with the reality that most students enter dental school as dependent learners, that is, dependent on the teacher to impart information while de-emphasizing the responsibility of the students to learn on their own. Traditional pedagogy in dental education focuses on the ability of students to memorize facts. These conditions result in a learning environment characterized by an overcrowded curriculum that is unevenly contemporary, one that tends to stultify, constrain, and inhibit self-directed learning.

As a corollary to critical thinking, dental curricula must help students learn how to learn. Academic dental institutions must break from the traditional teacher-centered and discipline-focused pedagogy to shift the burden of learning to the student. As the student progresses through dental school, he or she should progress from a dependent learner to an independent learner. Curricula must be contemporary, appropriately complex, and designed to encourage students to take responsibility for their learning. One might argue that attitudes and skills in learning and practice are just as important, perhaps more important, than the acquisition of technical knowledge during the four years of dental school. The explosion of scientific knowledge makes it impossible for students to comprehend and retain all the information necessary for a lifetime of practice during the four years of the dental school curriculum. Students must “learn how to learn,” and faculty must serve as role models who understand and value scientific discovery.

Humanistic Environment

Academic dental institutions are societies of learners. Dental students will graduate and join a learned and, ideally, a learning society of oral health professionals. A humanistic pedagogy is one that

inculcates respect, tolerance, understanding, and concern for others. When faculty and students exhibit humanistic values, there is freedom to explore, to take appropriate risks, and to learn without intimidation. A humanistic approach is characterized by close professional relationships between faculty and students, fostered by mentoring, advising, and small group interaction. Students who are respected learn to respect their patients, both present and future, as living human beings, as individuals with a diversity of backgrounds, life experiences, and values. A humanistic environment establishes a context for the development of interpersonal skills necessary for learning, for patient care, and for making meaningful contributions to the profession.

Scientific Discovery and the Integration of Knowledge

Academic dental institutions play an inexorable role in developing new knowledge, transferring that knowledge for the improvement of the oral, craniofacial, and systemic health of the public, and educating the next generations of researchers and scholars. The interrelationship among basic, behavioral, and clinical sciences is a conceptual cornerstone to clinical competence. The CCI recognizes that basic and behavioral science integrated with clinical practice is essential in the preparation of the new general dentist so that he or she can solve patients’ problems and incorporate new concepts and therapies over lifetime careers. Advances in genetics and molecular biology promise to change the health care system in significant ways—probably within the lifetime of today’s dental school graduates.

Learning should occur in the context of real problems rather than within singular content-specific disciplines. Learning objectives that cut across traditional disciplines and inform the expected competencies of graduates are important components to curricular design. As schools seek to decompress curricula by removing extraneous subject matter, any displacements of basic science should be counterbalanced by integrating basic science with clinical science. Beyond the acquisition of scientific knowledge at a particular point in time, the capacity to think scientifically—to apply the scientific method—is pivotal if students are to analyze and solve oral health problems, understand research, and practice evidence-based dentistry. Included in the commitment to science, scientific values, contemporary curricula, and integration of knowledge

are the recognition and action needed to reconstitute and represent the social and behavioral sciences in a substantive and visible manner. The behavioral and social sciences create a true intersection for professional practice that is humanistic, scientific, and ultimately patient-centered.

Evidence-Based Oral Health Care

The American Dental Association (ADA) defines evidence-based dentistry (EBD) as an approach to oral health care that requires the judicious integration of systematic assessments of clinically relevant scientific evidence, relating to the patient's oral and medical condition and history, with the dentist's clinical expertise and the patient's treatment needs and preferences.⁵ EBD is based on using thorough, unbiased reviews and critical appraisal of the best available scientific evidence in combination with clinical and patient factors to make informed decisions about appropriate health care for specific clinical circumstances. EBD relies on the role of individual professional judgment in this process. The content of dental curricula should be based on the principles of evidence-based inquiry; faculty should practice EBD and model critical appraisal for students in dental school clinics; as scholars, faculty should contribute to the body of evidence supporting oral health care strategies by conducting research to determine best practices; and students should learn and practice critical appraisal of research evidence while they are in dental school.

Assessment

The effectiveness of educational principles and pedagogical practices becomes known when student learning is assessed. Academic dental institutions should conduct regular assessments of students' learning throughout their educational experience. Such assessment should not only focus on whether the student has achieved the competencies necessary to advance professionally (summative assessment), but should also assist learners throughout their educational experience in developing the knowledge, skills, attitudes, and values considered important at their stage of learning (formative assessment). In an environment as described above, where critical thinking and humanistic values are prominent, students are encouraged to self-assess. Self-assessment is indicative of the extent to which students take responsibility for their own learning.

Successful assessment not only improves student learning; it is basic to curriculum management. As a means to improve curricula, assessment involves a dialogue between and among faculty, students, and administrators. Based on the assumption that the society of learners—faculty and students at an institution—is responsible for its outcomes, evaluation of the curriculum is a process in which both faculty and students should engage. Hence, students have roles to play on committees and in other groups that discuss, design, and modify curricula. Meaningful feedback occurs best when it is ongoing rather than a definitive evaluation at the conclusion of a course. Continuous improvement occurs only when both methods and outcomes are continuously assessed.

Faculty Development

Faculty development is not optional—it is a necessary condition for change and innovation in dental education. The environment of higher education is changing dramatically and, with it, health professions education. New dental faculty face challenges that are different from their predecessors': significant student debt and a growing gap between academic and private practice incomes; more diverse students; an explosion of knowledge and information made available through new technologies; more rapid emergence of science, such as molecular biology, which promises to change the practice of dentistry within their lifetimes; greater public accountability; more use of part-time and non-tenure track faculty; and increasing expectations that threaten to undermine the quality of faculty work-life. A subsequent CCI article will address specific issues related to faculty work-life, but among the considerations that must be considered are curricula that remain teacher-centered rather than learner-centered. As stated in a recent study of higher education, "The present educational system of courses, credits, and calendar-based systems of teaching and learning focuses by its very nature solely on how *faculty* work. As a result, all attempts to achieve efficiency and productivity within this system inevitably involve increases in faculty workload."⁶ The situation in dental education has been similar.

Self-assessment is an expectation not only of students, but of faculty as well. The concepts in this document call for teachers to reexamine the relationship between what they do and what students learn, to change from the expert who imparts information

to a facilitator of learning who helps the student discover new knowledge. Faculty must reexamine their teaching assumptions and practices. These concepts constitute a cultural change in dental education. For change and innovation to occur in dental education, faculty knowledge, skills, attitudes, and values must also change. As in any complex social or professional organization, people—dental faculty—will either facilitate or subvert the change process. Compelling reasons for change and innovation must be clearly stated, and the rationale for new ways of teaching and learning must be substantiated. Reward systems must recognize those who successfully make change, and administrators must align respected colleagues as champions of new ideas. Ongoing faculty development is a requirement not only to foster curricular change, but also to preserve the academic dental profession. Administrators, ADEA, and other national organizations have a responsibility to lead the way in providing programs and processes to assist faculty in implementing change and innovation in dental education.

The Health Care Team

The year 2000 report of the U.S. surgeon general on oral health in America clearly placed oral health within the context of systemic health. The surgeon general's positioning of the nation's often substandard oral health as a "silent epidemic" made a compelling case that access to oral health care is among the nation's most significant health care problems.⁷ Driven by the imperative to improve access, the dental team is changing. At the 2006 ADA House of Delegates meeting, delegates accepted a workforce study that provides two new models for allied dental personnel: the Oral Preventative Assistant (OPA) and the Community Dental Health Coordinator (CDHC).⁸ The American Dental Hygienists' Association continues to develop its concept of the Advanced Dental Hygiene Practitioner.⁹ Considering these and other broad trends affecting the workforce, ADEA held a summit conference in 2006 on the future of allied dental education and has issued a report on unleashing the potential of the allied dental workforce.¹⁰ As access drives a new vision of the dental team, dental school curricula must change to develop a different type of dentist, engaging dental students early in their educational experiences to work with expanded duty allied colleagues in a team environment with the dentist serving as a manager of care.

Access to oral health care and the connection of oral health to general health form a nexus that links oral health care providers to colleagues in other health professions. In 2003, a special ADEA President's Commission on access argued that family physicians, pediatricians, other primary care physicians, nurse practitioners, and physician assistants should be enlisted as part of the oral health team. Moreover, the commission maintained that dentists must become vital members of the health care team by assessing the overall health of patients through diagnosis, screening, and referral.¹¹ These positions are reflective of a 2001 Institute of Medicine (IOM) study that concludes: "All health care professionals should be educated to deliver patient-centered care as members of an interdisciplinary team, emphasizing evidence-based practice, quality improvement approaches, and information."¹² This vision of the health care team is clouded by the reality that students in different health professions have little interaction with each other. This situation is particularly true for dental students, who typically experience the four years of dental school in almost complete isolation from medical, nursing, pharmacy, and other students in the allied health professions and thus leave school with little sense of the overall health care system.

In a follow-up to its 2001 report, the IOM reiterated an emphasis on collaboration among nurses, pharmacists, physician assistants, and the allied health professions. Regrettably, dentistry was not represented among those who contributed to this 2003 report, and dental services were included among the allied health professions, which should be cause for reflection and concern among dental educators and practitioners.¹³ A 2005 ADEA Leadership Institute study involving seven academic health centers and forty-one educational and administrative leaders indicated that, while dental schools were in favor of interprofessional activities, "there was a general impression that dental schools were isolated from the other schools at the academic health center."¹⁴ There are significant obstacles to educating dental students to play a meaningful role on the health care team: funding; culture, including attitudes of administrators, faculty, and students; technology; reimbursement mechanisms; and perhaps the greatest obstacle, insular and overcrowded curricula. The obstacles are many, but so are the opportunities to educate dental school graduates who will assume new roles in safeguarding, promoting, and caring for the health care needs of the public.

Conclusion

The CCI proposes these principles as an environmental framework for creating the ideal dental education experience for our students and faculty. Change and innovation will occur in a variety of ways, unique to each dental school's mission. Change and innovation are also influenced by a number of organizations and stakeholders that directly affect each school's curriculum. Most of these groups operate independently of each other in adopting policies, positions, and regulations that affect dental education. Effective change must be systemic. Through ADEA, the CCI represents the one place in dental education where dental school faculty, students, administrators, and regulatory groups that affect dental education can come together with the purpose of educating lifelong learners to provide evidence-based care to meet the needs of society. CCI welcomes comments to this document and others produced by the commission through its website (www.adea.org/CCI/default.htm).

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