

Discussion Papers

The Value of the Dental School to the University

Richard W. Valachovic, D.M.D.; J. Bernard Machen, D.D.S., Ph.D.; N. Karl Haden, Ph.D.

Dr. Valachovic is Executive Director, American Association of Dental Schools; Dr. Machen is President, University of Utah, and former AADS President (1988-89); and Dr. Haden is Associate Executive Director for Educational Policy and Research, American Association of Dental Schools. Direct correspondence and reprint requests to Dr. Valachovic at 1625 Massachusetts Avenue, NW, Washington, DC 20036-2212; 202-667-9433 phone; 202-667-0642 fax; ValachovicR@aads.jhu.edu e-mail.

The transition of dental education from apprenticeships and proprietary schools into the university early in the twentieth century successfully grounded oral health in science and medicine while giving dental schools a strong institutional basis from which to operate. Recently, the value university leaders by and large place on their dental schools was demonstrated at the October 1998 Summit Conference held by the American Association of Dental Schools (AADS)—the first time in health professions education that deans and senior university administrators gathered to discuss the future of the profession. The good relationship between dental schools and their universities is not one that dental educators can afford to take for granted. In this article, the evolution of dental education as part of the university is presented, as well as the definition of value according to the university. Dental schools add value to the university by 1) establishing a curriculum that integrates both basic and clinical sciences and skills related to diagnosis and treatment that require dexterity as well as knowledge; 2) featuring an extremely wide variety of types of faculty members, diversifying the environment, and providing a source of constant invigoration of the curriculum; and 3) advancing a mission of oral health research that has led to tremendous progress in primary, secondary, and tertiary prevention of disease. To those ends, suggestions are proposed in an effort to make the value of the dental school both *real* and *visible* to the rest of the university.

Dental medicine, like all the professions, has a longer history of practice than of a formalized approach to educating practitioners. The transition of dental education from apprenticeships and proprietary schools into the university early in the twentieth century successfully grounded oral health in science and medicine while giving dental schools a strong institutional basis from which to operate. For their part, universities that became home to schools of dental medicine gained the opportunity and the obligation to contribute to the operations of those schools, as well as the right to determine to a great extent their ultimate fate.

University leaders by and large value their dental schools and consider them part of the institution's academic enterprise and contribution to society. This view of dental schools was evident at the October 1998 Summit Conference held by the American Association of Dental Schools (AADS), the first time in health pro-

fessions education that deans and senior university administrators gathered to discuss the future of the profession. In a clear affirmation of the importance they attach to dental schools, forty-two senior administrators joined the forty-seven deans attending.

The good relationship between dental schools and their universities is nevertheless not one that dental educators can afford to take for granted. At a time of significant public and financial pressures on universities to demonstrate their own value, it is incumbent upon dental schools to seize the initiative in both articulating their value to the university and taking the necessary steps to guarantee that the school's value is consistent with and noticed by the larger university. After reviewing the history of dental education and its movement into the university, this chapter will consider how the university defines value and how dental schools fit within that definition.

The Evolution of Dental Education

The origins of dental education¹ can be traced back to ancient Middle Eastern and Asian writings about health problems related to the teeth and mouth, including references attributing dental decay to “the tooth worm” in a 5,000-year-old Sumerian clay tablet. Other famous early discussions of dental problems and treatment were found in the Ebers papyrus dated around 1550 B.C. and the Greek and Roman medical texts of Hippocrates (ca. 460-377 B.C.E.) and Galen (A.D. 129-201).

Yet, even during the Renaissance, when medical science began to revive in the West, oral health was among the many medical problems in which few educated practitioners took an interest. The slow and painful methods of tooth extraction used by European physicians—in contrast to barbers and others who performed the procedure more expeditiously—also helped separate dental from medical care. Advances in anatomy, biology, and other sciences in the 1500s nevertheless formed the theoretical basis for a specialized approach to oral health, and in 1728, Pierre Fauchard, the father of modern dentistry, published a two-volume text on the subject, in which he also identified a need for schools of surgery to include dental instruction. Most dental practitioners at that time had either learned their “trade,” as it was then called, through apprenticeships, or they simply offered their services to the public as self-proclaimed experts.

The move toward more formal dental education in the United States began when the state of Maryland chartered the Baltimore College of Dental Surgery in 1840. The establishment of this college, which may have occurred after the University of Maryland’s medical department refused to add dental education to its curriculum, exemplified the nineteenth-century debate over whether dentistry should be part of medical education or taught in separate schools. As a result of the resistance on the part of both dental and medical educators to incorporating dental medicine into medical schools, the four American dental schools that existed by 1865 were all freestanding. Another factor slowing the growth of school-based dental education was the frequent reluctance of prospective students and practicing dentists to enroll or teach in schools—students because it was easier and less expensive to serve an apprenticeship, and dentists because acting as preceptors to students supplemented their income. The result was that

by 1865, no more than 15 percent of the country’s 18,000 dentists were graduates of dental schools.

Despite this statistic, however, the trend was toward school-based education, motivated by concerns among school-educated practitioners and the general public about substandard care delivered by those inadequately trained as apprentices and others who practiced without any training at all. In 1860, the newly organized American Dental Association began issuing an annual report on the state of dental education, thus providing a regular forum for discussion and debate on the topic. Five new dental schools opened between 1865 and 1870: four were independent, but one, at Harvard in 1867, became the first university-based dental program in the nation. By 1884, twelve more schools had been established, nine of which were university-based.

The following period saw a rapid shift away from the earlier dominance of preceptor training, so that by the mid-1920s less than 3 percent of practicing dentists had trained under apprenticeships (p. 42).¹ The transition of dental education into schools, however, was not universally effective at first. While the 1880s and 1890s saw a great expansion of dental schools—by 1900 the United States had fifty-seven in operation, more than in 1999—most were freestanding, for-profit schools which had been opened to grant the licenses to practice required by new state laws, and were often little more than “diploma mills,” providing limited education and applying dubious standards of quality. Before long, state laws were changed to require licensure examinations and to mandate that only graduates of “reputable” schools, a euphemism for nonproprietary schools, could take the examinations. As a result, the establishment of new independent schools slowed dramatically, and the charters of many existing ones were revoked.

This rapid shift toward university-based training was assisted by two key developments in dental education, both of which occurred in the 1920s. The first occurred in 1923 with the formation of the American Association of Dental Schools (AADS), a consolidation of four existing dental associations under an agreement negotiated in part by Dr. William Gies, a Columbia University biochemist with particular interest in dental research. Designed from the beginning to convene, communicate, and collaborate within the profession, AADS was launched with forty-four active and three associate members, nearly all of them dental schools at universities. The association, along with its peer-reviewed journal (the *Journal of Dental Education*), founded a decade later, moved dental education

even farther along the road toward greater professionalism and support for research. Indeed at the AADS's first annual meeting, held in Chicago in 1924, Dr. Gies² presented a paper clearly stating his opinion on the necessity of locating dental schools in universities:

Dental education is a function of universities. The most favorable educational conditions for instruction in dentistry are plainly those provided in universities by cordial cooperation between the teachers of dentistry and those of the schools of medicine and engineering. Such cooperation insures the most effective teaching under the most advantageous circumstances for all concerned. (p. 143)

Only three years after the founding of AADS, a second turning point in the history of dental education occurred with the publication in 1926 of a now-classic report by the Carnegie Foundation for Teaching, following the landmark 1910 report on medical education known as the Flexner report. Written by Dr. Gies, the dental education report complemented the goals of the new AADS, for it made a strong case for why dentistry should be considered the oral subspecialty of medicine, but also why it should be taught in separate dental schools within universities. Gies further recommended a science-based curriculum for such schools and asserted that because dentistry was a serious medical field, not a trade, it deserved attention and support, including well-stocked libraries, research projects, and a full-time faculty comparable to that of a medical school.^{1,3}

The Gies report cannot be said to be responsible for the transition of dental education from proprietary schools into universities, as increasingly stringent state standards had already led to the closing of all but three of those schools by the time the report was published. But Gies articulated the case for university-based dental education so effectively that it has virtually never been challenged again. The number of schools of dental medicine grew in the second half of the twentieth century to a high of sixty in 1978-85, though six have closed since. The opening of Nova Southeastern School of Dentistry in September 1997 brought the total back up to fifty-five; the sole remaining independent school, Baylor College of Dentistry, had merged with the Texas A&M University system in September 1996.

Moving dental education into the university had significant effects on the profession, as that environment was not simply the physical location where the dental school was housed, but would become its insti-

tutional home—with all the complex interactions, pressure to share values, and attempts to balance caring with discipline that being part of a family entails. Indeed, placing dental schools within the framework of the university has not always been a perfect fit. Dental schools have traditionally had such a rigorous, relatively inflexible curriculum with extensive requirements that their disciplined, structured orientation may seem to vary considerably from the more free-thinking, reasoned discourse that flourishes in the rest of the university. Within the university family, there have been times when the dental school has resembled a reticent teenager who shuts himself in his room with his computer, pursuing his own interests, rather than joining the family picnic.

Nevertheless, the university is the best place for schools of dental medicine, for the sake of both the school and the university, as it is the key place in American life and culture that supports both learning and research, bestows credibility on individuals, and valorizes pursuits. As the IOM report¹ states, “dental schools need the intellectual vitality, organizational support, and discipline of universities and academic health centers. In return, dental educators must contribute to university life, especially through research, scholarship, and efficient management of educational and patient care programs” (p. 291).

The University and the Definition of Value

Since the establishment of universities in the Middle Ages, institutions of higher learning have supported a wide range of activities. Some of those activities may be said to have intrinsic value to the academic enterprise. Providing undergraduate education to students in the arts and sciences, for instance, and supporting scholarship in the liberal arts have value in and of themselves, independent of whatever material impact those pursuits may have elsewhere. Derek Bok, former president of Harvard University, says the quality most valued in the university is “intellectual achievement” and, most specifically, research, which “represents the ultimate expression of a scholar’s powers, intellectual labor brought to its highest, most exalted state” (p. 76).⁴ Such pursuits may seem esoteric and impractical to some critics, but universities have not considered doing away with them (though those areas have sometimes been scaled down), and the university,

as the realm of ideas, is seen as the proper place where those efforts are conducted.

Unlike the liberal arts, however, other activities or entities within the university must demonstrate that they also have utilitarian value—that they are good *for* something. Beyond whatever value they have in and of themselves, these entities are expected to provide some further, more tangible benefit to the university and the community it serves. The relationship between these entities and the core administration of the university is conceptually more similar to a contract than a charity. The alliance is expected to be reciprocal: it involves an exchange of something of value to both, and it requires accepting and meeting obligations on both sides.

The distinguished scholar Jaroslav Pelikan, who publishes on a wide range of topics including education, is an unabashed supporter of professional schools within universities. Extending the concepts developed in the 1850s by the seminal thinker on universities, Cardinal John Henry Newman, Pelikan⁵ argues that universities benefit from their professional schools at least as much as professional schools benefit from being part of universities:

For although it is true historically that many universities have, with greater or lesser hesitation, adopted the professional schools that happen to have been left at their fiscal and educational doorstep, there is some definition of the idea of the university implicit in any such decision. It is probably easier to specify the definition of “professional skill” and of professional training that is implicit there: the recognition that to qualify as a “profession,” an occupation or activity must involve some tradition of critical philosophical reflection, and probably the existence of a body of scholarly literature in which such reflection has been developed and debated. But the corollary of that thesis is probably a definition of the university as the only possible setting in which such reflection on a profession, and therefore the training informed by such reflection, can be carried on in its full intellectual context—and hence also a definition of the university that includes such training as a necessary element. (pp. 107-8)

Beyond these lofty thoughts, the urgency to define the utilitarian value of a university’s entities is often driven by the need to justify dollars spent. In the late twentieth century, when business management con-

cepts are applied to virtually every aspect of human endeavor, including even interpersonal relationships, individuals and institutions routinely apply cost-benefit analysis to all kinds of decision-making. What is it going to cost me? they ask. What will I get in return? At the same time, as universities seek to balance higher costs with decreased revenue, the drive for self-preservation has led many to adopt the “every tub on its own bottom” philosophy, where each unit of the university must be financially self-sufficient—meeting its budget on its own, rather than expecting to be subsidized by the greater university. With current education-wide budgetary constraints, this sort of pressure applies to private and state-supported universities alike.

If all parts of a university are affected to some degree by this financial pressure, it is the professional schools that bear the primary burden for demonstrating their utilitarian value to their universities—and those financial pressures are particularly imposing for dental schools. Medical education and dental education are more expensive to deliver than other areas of professional education such as law and business because health professions students must be provided with clinical educational experiences. But dental schools’ unit costs per student are much higher even than in medical schools. Medical students receive two years of basic sciences, which are usually taught by researchers who have other roles in the university as well, so the expense of their salaries is borne by more than one cost center. After classroom-based instruction, medical students go on to separate university-owned or -affiliated hospitals where their clinical education occurs. In dental schools, by contrast, both basic instruction and professional training are contained within the school, combining work in the classroom with training in the school’s own clinic, and producing an individual who can immediately go into practice following graduation. While medical students are paid during their internships, dental students continue to pay tuition while they are gaining their clinical experience. The dental curriculum also covers an extremely wide range of subjects, incorporating both general sciences and those related specifically to the mouth, as well as comprehensive diagnostic and treatment procedures. Dental schools, in addition, expect students to make major contributions to the cost of their education beyond tuition in such areas as the purchase or rental of instruments and payment of clinic fees.

The average total expenditure per student for all schools in 1996-97 was around \$60,000, of which only about one-third was recovered through tuition, student

fees, and clinical revenues.⁶ Consequently, the average dental school's expenditures that year were about half a million dollars more than revenue.⁶ With numbers like these, it is easy to see why forty-seven out of fifty-four dental deans surveyed for the IOM report cited funding problems or specific funding problems due to overreliance on tuition as the most significant weaknesses of their schools, and senior university officials agree that financing is their most immediate concern about dental schools.

How Dental Schools Add Value to the University

Arriving at a precise definition of the cost of a dental school to its university is difficult for many reasons, including the challenge of allocating expenses for jointly produced services such as teaching and patient care.^{1,7} Defining the school's "value" to the university, however, is even more difficult, for the concept includes elements that are nebulous and unquantifiable. Oscar Wilde's famous definition of a cynic is one who knows the price of everything and the value of nothing. If dental schools—which cannot afford to be cynical—are to thrive, their leaders must be as capable of defining the school's value as its cost and must be able to promote that value to their various constituents within the university and without.

Like all health professions schools, the basic missions of dental schools—and concurrently, their value to the university—have traditionally been defined as education, research, and patient care or service. As we look to the needs of the twenty-first century and the future of the profession, we need to expand those traditional categories to take account of changing conditions and requirements.

Since the establishment of dental education as a school-based entity, its core mission has been the education of practitioners. While there is a technical training aspect of dental education, the practice of dental medicine is grounded in scientific and medical knowledge—all of which are taught within the university setting. Because dental medicine, like all health professions, is also a changing profession, part of that educational mission is preparing graduates to be lifelong learners, so that their practice will continue to be informed by new developments in science, medicine, and treatment as they occur. As Marjorie Jeffcoat and William Clark⁸ stated, "A dental school environment and culture should nurture the search for and dissemi-

nation of new knowledge, encourage critical review of research findings, and foster communication among students, researchers, and clinicians. In such an environment dental students and dentists will be educated to be inquisitive, critical, lifelong learners" (p. 175).

With dental medicine among the most respected professions in America,⁹ universities can take significant pride in producing this group of highly regarded, well-educated, civic-minded professionals. Beyond that, by fulfilling their educational mission, dental schools provide value to their universities in other key ways. The first grows out of the fact that the dental school curriculum includes both basic sciences and skills related to diagnosis and treatment that require dexterity as well as knowledge. As a consequence, a dental school can be thought of as a laboratory for new methods of experiential education—not just basic and clinical sciences, but the integration of the two.¹⁰ The dental school also provides models for other innovative ways of teaching and learning: schools' increasing use of problem-based learning and computer-assisted instruction are good examples.¹¹⁻¹³ In addition, dental schools feature an extremely wide variety of types of faculty members. Not only do the faculty include individuals who have earned doctorates in addition to D.D.S. or D.M.D. degrees, but dental schools bring practitioners into the university environment to teach courses alongside full-time faculty. This arrangement diversifies the university environment and provides a source of constant reinvigoration of the curriculum from these entrepreneurs in the field.

In addition to education, the dental school provides value to the university through its mission of research. In the first half of the twentieth century, dental research was somewhat slow to establish itself, both inside and outside university-based dental schools.¹ The middle of the century, however, saw a surge in support for dental research, precipitated by the large number of military deferments granted because of dental problems during World War II. With the recognition that tooth and mouth problems directly affected the number of soldiers available for combat, dentistry became an element of national security, and research on oral health became a national priority. Financial support for dental research and the training of oral health researchers has since come from foundation and industry grants, as well as from federal funds disbursed primarily through the National Institute of Dental Research (recently renamed the National Institute of Dental and Craniofacial Research), one of the original parts of the National Institutes of Health.

Fulfilling the research mission of dental schools is of great value to the university, as “the creation or discovery of new knowledge is at the heart of the university’s mission” (p. 145).¹ This new knowledge is of particular value because it leads directly to the improved oral health—and thus health in general—of the population. Recent advances in dental research have led to dramatic improvements in the prevention and treatment of periodontal disease and in the earlier detection of oral cancer, and has given us a better understanding of the relationship between oral and systemic health, between pregnant women’s oral health and their babies’ birthweight, and between oral infection and diabetes. Research has also led to tremendous progress in primary prevention (preventing the disease from occurring), in secondary prevention (early intervention to treat the disease in its initial stages), and tertiary prevention (trying to rehabilitate back to form and function after disease has occurred).

Beyond this explosion of new knowledge in basic clinical sciences research, dental schools provide additional value to their universities through other forms of scholarship. Faculty in dental schools contribute to new knowledge in strategies for teaching and learning, in policy analysis, and in clinic and practice management. Through their published scholarship in these areas, dental researchers share new findings in these areas with faculty and students not only in dental education, but in other professional venues as well, making available such developments for replication and expansion across a wide range of educational endeavors.

The value these schools provide in research extends beyond the United States, as the American dental profession leads the international community in the development of scientific information, clinical acumen, and organization of the profession. American dental education thus has a great deal to share with the profession as it is practiced around the world. Indeed, dental education itself has made an inherent international contribution by virtue of the fact that it is one of the few university disciplines that had its origins in the United States. This international value provided by dental schools reflects extremely positively on their universities, especially those with a commitment to worldwide service.

In addition to education and research, the third essential mission of dental schools is that of service to the community, the primary form of which is patient care. It is becoming increasingly popular to speak of schools of dental medicine as the “front porch” of the

university, for oftentimes they are among the few units of the university that welcome and indeed invite individuals from the community to come in. Every dental school in the United States operates an active clinic that provides direct patient care on a consistent, regular basis—whether on the university campus or in off-site stationery or mobile clinics. A further value of these dental clinics is that they provide care to those often underserved in the population. Most clinic patients come from the lower socioeconomic groups and are either on Medicaid or have no dental insurance. The majority are children, and a significant number of the rest are people who have other special needs, such as AIDS/HIV or mental disabilities. University dental clinics provide direct access to care for patients who are not otherwise served, thus performing a service to communities that is of tremendous value.

Beyond this, university dental clinics also often provide dental care for members of the university community. And members of the dental school, both faculty and students, frequently are important advocates for dental care and disease prevention in the outside community—whether holding dental awareness days for the general population, partnering with local dentists and/or individuals from other health professions schools to organize and work in clinics in underserved areas, or helping to recruit prospective students for dental school, especially from underrepresented minority populations.¹⁴

Fulfilling dental education’s three core missions of education, scholarship, and service will continue to face challenges entering the twenty-first century—ranging from faculty recruitment and retention,¹⁵ to raising funds for research,¹⁶ to operating more effective and efficient clinics,¹⁷ to developing curricular changes¹⁰ and recruiting students to support an aging, more diverse population with changing needs for and access to dental care. Meeting those challenges, however, will increase the value dental schools provide to their universities and the communities they serve.

Value Must Be Both Real and Visible

With so many areas in which dental schools can and do provide value to the university, how does an individual school determine where to place its emphasis? And how can it evaluate whether it is adequately fulfilling its obligation to provide value to its univer-

sity? Helping dental schools answer these questions was a key goal of the October 1998 AADS summit conference, which demonstrated how dental education is exercising leadership by restating and reformulating its value to the university.

The first step in answering these questions is to look to the university's definition of its own mission. Every dental school dean should have a thorough understanding of the mission statement and strategic plan of his or her university and must then seek mission synthesis by helping to shape the school into a closely integrated, fully contributing part of the whole. If the school is a unit of a large state university, for example, which is expected by its legislature to perform extraordinary service to the community of the state, then the school must be tireless and creative in seeking ways to expand its patient care and service mission. If the university is considered a major research institution that consistently highlights its scientific achievements and lionizes its Nobel Prize winners, then the dental school must position itself to conduct serious scientific research. If the university views itself as a center of teaching excellence whose core purpose is to educate and train practitioners, then the dental school should devote its energies to developing the most innovative and efficient means for dental education possible. In the process, dental schools should also be realistic about the risk inherent in trying to be all things to all people and guard against the danger of overextending themselves. It is far better to choose certain areas in which to specialize—paying particular attention to those areas, of course, that synthesize with the core values of the university.¹⁸

It is also important for dental educators to remember that the university's core values may be revealed implicitly, through its actions, as often as through explicit statements or carefully worded documents. Furthermore, because values evolve over time, the leaders of dental schools must also develop an ability for "environmental scanning"—reminding themselves to be sensitive to signs expressed in multiple and changing ways, in order to recognize the unstated yet often-critical values in their environments.

Guiding their schools to mission synthesis is thus a challenging process that may well require skills not previously included in job descriptions for the leaders of dental education. Developing those skills, however, is essential, for the importance of dental schools' meshing their priorities with those of their universities cannot be overstated. Doing so is critical for the survival of schools of dental medicine and for the future of the profession.

Furthermore, as the IOM report reminds us, the dental school's contribution to the mission of the university must not just be real, it must also be visible. If ours is an age that applies cost-benefit analysis across the board, it is also an age in which individuals are so constantly bombarded with information that publicity is essential to gain attention and success for virtually any endeavor. The isolation on university campuses into which dental schools have occasionally fallen in the past can not be permitted if they are to survive and thrive. Dental school deans must educate their university leaders about why dental education is so expensive and what they are doing to financially support their own "tub" in the university environment. They must also educate university administrators, their colleagues from other units of the university, and other relevant parties such as state legislators, boards of regents, and community leaders about advances in oral health and about the public good that their schools do. They can reduce isolation further and contribute to their research mission at the same time by instigating or joining multidisciplinary research projects with other units of the university.¹⁹ Working with other university entities on health service projects also reduces isolation and demonstrates how the dental school can be a team player, while contributing to its service mission as well.

In addition, it is critical that members of the dental school participate in the governance of the university as a whole by serving on search and other committees, in faculty senates, and in other university-wide efforts.²⁰ Dental educators must be sitting at the table when the agenda of the university is shaped and its operations carried out. It may seem at first glance that such efforts fall outside the scope of dental education, but they do not: participating fully in the shaping of the system in which the dental school operates is integral to the health and welfare of that particular element of the system. Sharing in university governance ensures that dental education is part of creating the future, not simply becoming subject to what is created.

Meeting these needs places huge responsibility on the leadership of dental education, for it is the deans and their associates who are the ones who put their dental schools at the table of the university and keep them there.²¹ Those deans must exercise strong yet prudent leadership in understanding the mission of their universities, synthesizing their schools' mission with that of the university, balancing the big picture with the little details, and making hard decisions about priorities and future directions. By doing so, they leave no doubt about how valuable their schools truly are.

An Ongoing Process

As industry has learned in the last part of the twentieth century, creating value and keeping customers is an ongoing process that must be subjected to continuous quality improvement. It is not just a matter of meeting customers' needs; anticipating those needs is also required. If dental education is to continue to satisfy its "customers"—university leaders, students, federal and industry partners, and the general public—it must dedicate itself to an ongoing process that both meets and anticipates those needs and, just as importantly, receives credit for doing so.

References

1. Field MJ, ed. *Dental education at the crossroads: challenges and change*. Institute of Medicine Report. Washington, DC: National Academy Press, 1995.
2. Gies WJ. A further discussion of some problems in dental education. *Organization and proceedings of the first annual meeting of the American Association of Dental Schools*. Chicago: American Association of Dental Schools, 1924.
3. Tedesco LA. Issues in dental curriculum development and change. *J Dent Educ* 1995;59:97-147.
4. Bok D. *Higher learning*. Cambridge: Harvard University Press, 1986.
5. Pelikan J. *The idea of the university: a reexamination*. New Haven: Yale University Press, 1992.
6. 1996/97 Survey of predoctoral dental educational institutions. *Finances*, vol. 5. Chicago: American Dental Association, December 1997.
7. On the difficulty of assessing cost-benefit ratios in dental schools, see Williams RL, *From departmental mergers to school closings: lessons in organizational change in dental education*; in this volume.
8. Jeffcoat MK, Clark WB. Research, technology transfer, and dentistry. *J Dent Educ* 1995;59:169-84.
9. For example, dentistry was ranked the fifth most trusted profession in a 1997 Gallup Poll. See the American Dental Association's section on careers in dentistry on the AADS web site (www.aads.jhu.edu).
10. See, for example, Hendricson WD, Cohen PA. Future directions in dental school curriculum, teaching, and learning; in this volume.
11. Barrows HS. The essentials of problem-based learning. *J Dent Educ* 1998;9:630-3.
12. Fincham AG, et al. Problem-based learning at the University of Southern California School of Dentistry. *J Dent Educ* 1997;5:417-25.
13. Young NA. Problem-based learning: using cases to drive the learning process. *J Dent Educ* 1998;3:235-41.
14. For more on the dental school contributing to the public good, see DePaola D in this compendium.
15. See also Kennedy JE, Hunt LJ. Meeting the demand for future dental faculty; in this volume.
16. See also Genco RJ. Building partnerships and interdisciplinary collaborations in oral health research; in this volume. In addition, see chapters by Blumenthal D, Snyderman R, and Hittelman KJ and O'Connor MB in: Rubin ER, ed. *Mission management: a new synthesis*. vol. 2. Washington, DC: Association of Academic Health Centers, 1998.
17. See also Baker RJ. The clinical enterprise: creating new strategies and structures. In: Rubin ER, ed. *Mission management: a new synthesis*. vol. 2. Washington, DC: Association of Academic Health Centers, 1998.
18. For a cautionary note regarding the need for dental schools to retain some independence to guard against the unlikely but possible diminution of universities in the future, see Albino J. Who will lead dental education in the future?; in this volume.
19. See Genco in this volume.
20. For a realistic assessment of challenges faced by deans who want their faculty to involve themselves more in the governance of the university, yet must draw from faculty members who are often nontenured and part-time, see Kennedy-Hunt in this volume.
21. See Albino in this volume.