

# The Dental Curriculum at North American Dental Institutions in 2002-03: A Survey of Current Structure, Recent Innovations, and Planned Changes

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*Abstract:* This study examined the current format of curricula at North American dental schools, determined curriculum evaluation strategies, and identified recently implemented changes as well as planned future innovations. The academic affairs deans of sixty-four North American dental schools received an email survey in August 2002; a second, follow-up survey was sent to nonresponders in February 2003. Online responses were collected and analyzed using SurveyTracker software. The final response rate was 87 percent, with forty-eight U.S. schools and eight Canadian schools responding. Respondents were asked to select descriptive statements about the general organization of their curricula and the degree to which problem-based learning (PBL), case-reinforced learning (CRL), curricular integration, and community-based clinical treatment experiences were incorporated. They were also requested to identify strategies employed to evaluate the curriculum and to report recently completed and desired future curriculum modifications. In regard to desired future curriculum innovations, respondents identified why they were considering curriculum changes and identified resources needed to implement the planned changes. Sixty-six percent of those who responded defined their current curriculum organization as primarily discipline-based with a few interdisciplinary courses. Nearly 60 percent of schools reported that they used PBL and CRL in specific courses or for components of certain courses, but only 5 percent of the respondents indicated that all of their courses used PBL. Regarding integration of major sections of the curriculum, only 7 percent reported that their entire curriculum was organized around themes of interrelated topics. Sixty-four percent reported that their curriculum had required community-based clinical treatment experiences for students. The most frequent innovations in the past three years were increased use of computer and web-based learning (86 percent), creation of patient care experiences early in the curriculum (84 percent), enhancement of competency evaluation methods (84 percent), and curriculum decompression (79 percent). These items plus increased community-based care were the most frequently identified future curricular innovations. There were virtually no differences between the responses of Canadian and U.S. dental schools. The results of this study help to broadly characterize dental curricula at North American dental institutions and identify curriculum modifications anticipated by the academic dean respondents.

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In the past decade, there has been considerable debate about the future direction of the dental curriculum, and numerous calls for change have been issued by professional panels and constituencies. In 1995, the Institute of Medicine (IOM) report entitled *Dental Education at the Crossroads: Challenges and Change* suggested a closer integration with medicine and the overall health care system and

recommended significant curricular reforms relative to content and presentation.<sup>1</sup> Following the 75<sup>th</sup> Anniversary Leadership Summit Conference of the American Association of Dental Schools (now American Dental Education Association) in 1998, conference proceedings detailed strategies for increasing the value of dental schools to parent universities and to guide dental education into the next

century.<sup>2</sup> In 1998, the Commission on Dental Accreditation of the American Dental Association adopted predoctoral dental program accreditation standards requiring competency-based assessment.<sup>3</sup> In 2000, the first ever U.S. Surgeon General's report on oral health, *Oral Health in America: A Report of the Surgeon General*, detailed the nation's most common oral health problems while highlighting the need to increase access to care for many underserved populations, particularly ethnic minorities.<sup>4</sup>

Have North American dental schools responded to these calls for reform by making significant changes to the dental curriculum? Tedesco<sup>5</sup> reviewed the numerous dental curriculum reform reports over the past seventy-five years since the pivotal 1926 Gies Report and reached the conclusion that the dental education community had responded with "some growth and little change." The most common criticism of today's dental curriculum is that it is excessively dense, in terms of the number of courses and clock hours. This curricular density is perhaps a by-product of the tension between faculty who favor expanding the biomedical emphasis of the curriculum to allow dental practitioners to assume an even greater role in managing a patient's health and those who want to maintain a traditional technical focus.<sup>6</sup>

Writing in 1995, Tedesco observed that "attempts to make the basic sciences relevant to clinical practice, to protect the curriculum from overcrowding by maintaining time for reading and independent study, and to produce lifelong learners with a spirit of inquiry and highly professional, ethical standards are 60 years old."<sup>5</sup> Hendricson and Cohen reported that there is "a well-developed agenda of reform. For the most part, these reforms represent ideas advocated for many years but only sporadically implemented."<sup>6</sup> The 1995 IOM study of dental education concluded that the problem in reforming dental education is not so much consensus on directions for change but difficulty in overcoming obstacles to change. Agreement on educational problems is widespread. The curriculum is crowded with redundant or marginally useful material and gives students too little time to consolidate concepts or develop critical thinking skills. Comprehensive care is more an ideal than a reality in clinical education, and instruction still focuses too heavily on procedures rather than on patient care.<sup>1</sup>

Hendricson and Cohen identified eleven dental education reform recommendations that have been consistently advocated over the years.<sup>6</sup> These recommendations appear in Table 1.

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**Table 1. Components of the dental education reform agenda**

1. Redesign the curriculum to incorporate competency-based learning principles and evaluation methods as required by the Commission on Dental Accreditation standards.
2. Decompress the curriculum by eliminating outdated and peripherally relevant material.
3. Increase educational collaboration between dentistry and the other health professions, featuring more curricular emphasis on the interaction of dental and medical problems.
4. Redirect basic science coursework toward disease pathophysiology taught by problem-based techniques.
5. Expose students to patients and their oral health and systemic medical problems from the first days of the curriculum to the last.
6. Revitalize the science underlying clinical decision making via evidence-based approaches.
7. Organize group practice teams in the clinical years to promote more continuity in faculty-student relationships and expand peer teaching by students working together in clinical teams.
8. Increase the use of community-based clinics as training sites for students.
9. Include a clinical experience in the final year of the curriculum, or in a postgraduate internship year, which replicates the comprehensive care environment of the general dental practitioner
10. Utilize computer-based and web-based information technology to enrich student learning.
11. Rededicate dental school clinics to serving the oral health needs of the public rather than primarily viewing patients as educational material for students.

Source: Hendricson WD, Cohen PA. Oral health in the 21<sup>st</sup> century: implications for dental and medical education. *Acad Med* 2001;76(12):1181-207.

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Four other factors are likely to influence the scope, structure, and content of dental education in the future. These include: 1) projected shortages of dental school faculty in the near future (70 percent of all dental school faculty are fifty years or older, and 40 percent are projected to retire by 2010<sup>7,8</sup>); 2) the declining revenue streams for publicly funded higher education; 3) the geographic maldistribution of the dental workforce, which is significantly underrepresented in more than 2000 Dental Health Profession Shortage Areas encompassing more than forty million people living primarily in rural and inner city areas<sup>9</sup>; and 4) the corresponding need to eliminate disparities in oral health status among these underserved populations.

Will these factors catalyze change in the dental curriculum? For example, the 2003 report of the ADEA President's Commission, "Improving the Oral Health Status of All Americans: Roles and Responsibilities of Academic Dental Institutions,"<sup>10</sup> makes several recommendations that could have a profound effect on dental education, including:

- educate dental students to assume new roles in prevention, detection, and early recognition of oral and systemic medical diseases in collaboration with other health care professionals;
- expose dental students to different settings for oral health care and dental practice including public health, hospitals, and community health clinics;
- create more effective mechanisms to prepare dental students to provide oral health services to diverse populations and patients with special needs;
- establish patient care rotations in off-site clinics where students can deliver oral health care to underserved populations; and
- develop distance learning programs that allow dental students to receive much of their education within the community where they live and thus increase access to dental school among underrepresented minority students.

The purpose of this article is to report the results of a survey completed by the academic deans of fifty-six North American dental schools to determine the format of their respective curricula and to identify innovations recently implemented or planned for the near future. Respondents also identified issues that influenced curricular change at their schools. Survey responses are analyzed in light of the dental education reform agenda in Table 1. We hope that the presentation of the results of these data will stimulate dialogue about strategies for strength-

ening the future dental curriculum and dental education programs.

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## Methods

A thirty-question survey about the format and characteristics of the dental curriculum at North American dental schools was developed in the summer of 2002. The original purpose of the survey was to collect data for presentation at the joint meeting of the ADEA Council of Faculties, Council of Sections, and Council of Students in October 2002 in Milwaukee, Wisconsin. The survey was developed by two of the authors (DK and WH) with editorial assistance from the other coauthors (KH, TT). Survey content was, in part, based on the dental education reform agenda previously described. The survey was field-tested for format, content, readability, and time to complete by three dental school associate deans, six dental school faculty members, and three educational specialists in July 2002 and was subsequently modified to reflect recommendations from these field-test respondents. Specialists in survey design and health professions curriculum at the University of Texas Health Science Center at San Antonio also reviewed the survey and provided suggestions that were incorporated into the final version. The academic deans of the sixty-four dental schools operating in August 2002 received an electronic version of the survey embedded in an email message. Email addresses were obtained from ADEA. A second follow-up survey was sent electronically and in a paper-pencil format to nonresponders in February 2003.

The academic deans who received the survey were asked to indicate the name of their school and respond to questions in ten areas: 1) organizational structure of their curricula, 2) extent of integration around themes or threads of interrelated topics, and 3) the degree to which problem-based learning (PBL), case-reinforced learning (CRL), and community-based patient treatment experiences were incorporated. Respondents were also asked to identify: 4) methods employed to assess curriculum effectiveness, 5) innovations implemented in their curriculum during the past three years, 6) projected curriculum changes over the next three years, 7) reasons for considering curriculum changes, 8) the number of current faculty vacancies and the impact of these vacancies on curriculum implementation, 9) re-

sources needed to make future curriculum changes, and 10) roles that ADEA should play in regard to dental school curriculum.

To increase the consistency of responses for questions about PBL, CRL, and community-based patient treatment, the following definitions were provided on the survey:

**PBL** = No lectures; students learn by a discovery method through exploration of patient problems in small groups guided by faculty facilitators; students take responsibility for guiding their own learning and from peer teaching.

**CRL** = Students participate in small-group, case-based conferences to reinforce lecture-based instruction. In CRL, cases allow students to discuss application of lecture information and to use this information to analyze problems.

**Community-based clinical treatment experiences** = opportunities for dental students to provide care in community-based clinics or private practices (emergency services, periodontal, restorative, endodontic, pediatric, or other dental specialty care). The term “community-based clinical treatment experiences” is not intended to be synonymous with community service activities where dental students might go to schools to teach preventive techniques or where dental students help build homes for needy families.

Some questions required the selection of one best answer while others asked respondents to check all items that applied from a menu of responses. Sta-




tistical analysis consisted of producing descriptive statistics (frequency distributions) for each survey item. Respondents were also able to write in responses to augment their answers for most of the questions on the survey.

## Results

Completed surveys were received from fifty-six North American dental schools for a response rate of 87 percent. Of these responses, forty-eight were U.S. dental schools and eight were Canadian dental schools. The survey was sent to the associate dean for academic affairs at each dental school. However, the respondents were forty-two academic deans, six curriculum directors, one dean, a dean of students, and six individuals who identified themselves as “other.”

Respondents indicated the name of their school and answered survey questions divided into ten sections previously described. In response to the question about curriculum structure, 66 percent defined their curriculum organization as largely discipline-based with a few interdisciplinary courses (Table 2). Fifty-nine percent of schools reported that they used problem-based learning in either individual courses or in specific components of some courses, but only 5 percent of the respondents (n=3 schools) indicated that all of their courses used the PBL format (Table 3). Thirty-eight percent of schools (n=21) reported that they used case-related learning in all or some components of courses (Table 4). Regarding the integration of major sections of the curriculum (Table 5), only 7 percent (n=4 schools) reported that their entire curriculum was organized around themes of interrelated topics, and 16 percent reported that at least one major section of their curriculum was or-

**Table 2. Current organization and presentation of the dental curriculum (N=56 dental schools)**

Response	n	Percent	0	20	40	60	80	100
Traditional discipline- and lecture-based	11	20%						
Largely discipline-based, with a few interdisciplinary courses	37	66%						
Not discipline-based; interdisciplinary courses and integrated components	8	14%						

**Table 3. Use of PBL in the dental curriculum (N=56 dental schools)**

Response	<i>n</i>	Percent	0	20	40	60	80	100
All courses use PBL format	3	5%						
Some courses use PBL for entire course, but most are lecture-based	8	14%						
Some courses use PBL for specific components with rest taught by lecture	25	45%						
No courses use PBL, as defined	20	36%						

**Table 4. Use of CRL in the dental curriculum (N=56 dental schools)**

Response	<i>n</i>	Percent	0	20	40	60	80	100
All courses employ CRL format	1	2%						
Some courses employ CRL for entire course, but most are lecture-based	20	36%						
No courses use CRL for entire course; some use CRL for course components	32	57%						
No courses use CRL, as defined	3	5%						

ganized around themes. A high percentage of schools (64 percent) reported that their students were required to complete community-based clinical treatment experiences (Table 6); however, there was considerable variation in the amount of community-based experiences from school to school. Of note, only one school indicated that the dental curriculum did not contain either required or elective community-based clinical treatment experiences.

For curriculum assessment, respondents were asked to select all of the strategies that they used to evaluate the effectiveness of school curricula (Table 7). Student evaluation of courses and instructors, comparison to accreditation guidelines, National Dental Boards examination results, faculty opinions about the curriculum, and results of course evaluations by internal curriculum committees were each selected by at least 95 percent of the respondents.

Respondents also identified curriculum innovations that their schools had implemented in the past three years (Table 8). Increased use of computer-based technology (86 percent) was the most frequent innovation, followed closely by creating more opportunities for freshmen and sophomores to interact with patients (84 percent) and creating better methods to evaluate student competence (84 percent). Other curriculum innovations during the past three years that were reported by more than 70 percent of respondents were decompressing the curriculum, creating more opportunities for students to learn evidenced-based dentistry, and creating more opportunities for students to learn and conduct research.

Respondents were asked to identify curricular innovations planned for the next three years (Table 9). The response selected most often was “increase the use of computer-based technology” (82 percent).

**Table 5. Extent of curricular integration at schools (N=56 dental schools)**

Response	n	Percent	0	20	40	60	80	100
Entire curriculum organized as threads of interrelated topics	4	7.1%						
At least one major section organized around interrelated threads	9	16.1%						
A few courses with interrelated subject, most traditional	35	62.5%						
Traditional biomedical and dental disciplines	8	14.3%						

The next most frequently selected responses were “create better methods to evaluate student competence” by 57 percent, decompress the curriculum (55 percent), and increase community-based patient care (54 percent).

In identifying the reasons why faculty and or administration may be considering curricular changes at the schools (Table 10), the response selected most frequently was “recognition that we need to make better use of resources” (59 percent), followed by the need to incorporate new scientific findings (54

percent) and alumni feedback and recommendations (48 percent).

Table 11 displays the resources that schools identified as essential for implementing planned curricular changes. Eighty-eight percent of respondents identified “faculty development related to curriculum, evaluation, and assessment” as an essential resource needed for future change. Other frequently identified resources included improving information technology capabilities (59 percent), providing faculty with protected time for curriculum work (59



















**Table 6. Community-based (c-b) clinical treatment experiences (N=56 dental schools) (respondents were requested to select all items that applied)**

Response	n	Percent	0	20	40	60	80	100
Require community-based experiences (c-b exp.)	36	64.3%						
Require ≥6 weeks of c-b experiences in senior year	10	17.9%						
Require 1-5 weeks in c-b experiences in senior year	23	41.1%						
Required experiences freshman through junior years	8	14.3%						
Curriculum contains elective c-b experiences	22	39.3%						
Curriculum contains no c-b experiences	1	1.8%						
No response	1	1.8%						




















**Table 7. Strategies used to evaluate the effectiveness of school curriculum (N=56 dental schools)  
(respondents were requested to select all items that applied)**

Response	<i>n</i>	Percent	0	20	40	60	80	100
Accreditation guidelines	55	98.2%						
Consultant recommendations	35	62.5%						
Reports from national panels	19	33.9%						
National board results	53	94.6%						
National board exam content	34	60.7%						
Licensure board pass-fail rates	43	76.8%						
Licensure board content	28	50.0%						
Student attrition rates	24	42.9%						
Student performance on comp. exams	47	83.9%						
Faculty opinions about curriculum	53	94.6%						
Residents' (recent grads) opinions	47	83.9%						
Community practitioners' input	31	55.4%						
Public health forecast of needs	25	44.6%						
Course evaluations by Curriculum Committee	53	94.6%						
Reports of curriculum innovation at other schools	32	57.1%						
Student evaluation of courses and instructors	55	98.2%						
Student focus groups	39	69.6%						
No response	0	0.0%						

**Table 8. Items already incorporated into responding schools' curriculum or actions taken to improve curriculum quality in the past three years (respondents asked to check all that apply) (N=56 dental schools)**

Response	<i>n</i>	Percent	0	20	40	60	80	100
Decompressed the curriculum	44	78.6%						
Increased patient care provided by students at community sites	28	50.0%						
Create curriculum organized around threads	26	46.4%						
Focused basic science coursework toward patho-physiology	24	42.9%						
Provided opportunities for freshmen & sophomores to interact with patients	47	83.9%						
Increased the use of computer-based technology	48	85.7%						
Provided distance-learning opportunities	3	5.4%						
Implemented problem-based learning in significant portion of curriculum	13	23.2%						
Created articulation agreements with other institutions	4	7.1%						
Created a substantial comp care experience in senior year	39	69.6%						
Created better methods to evaluate student competence	47	83.9%						
Created a competency-based versus time-based curriculum	20	35.7%						
Created a D.D.S.-Ph.D. track	15	26.8%						
Created more research opportunities for students	40	71.4%						
Increased educational collaborations with other campus schools	31	55.4%						
Provided more curricular emphasis on medical problems	36	64.3%						
Provided opportunities for students to use evidence-based dentistry	42	75.0%						
Established group practice teams in clinic	29	51.8%						
No response	0	0.0%						

**Table 9. Curricular innovations planned by responding schools for the next four years (respondents were requested to select all items that applied) (N=56 dental schools)**

Response	<i>n</i>	Percent	0	20	40	60	80	100
Decompress the curriculum	31	55.4%						
Increase patient care provided by students at community sites	30	53.6%						
Create curriculum organized around threads	26	46.4%						
Focus basic science coursework toward patho-physiology	16	28.6%						
Provide opportunities for freshmen & sophomores to interact with patients	20	35.7%						
Increase the use of computer-based technology	46	82.1%						
Provide distance-learning opportunities	6	10.7%						
Implement problem-based learning in significant portion of curriculum	11	19.6%						
Create articulation agreements with other institutions	0	0.0%						
Create a substantial comp care experience in senior year	13	23.2%						
Create better methods to evaluate student competence	32	57.1%						
Create a competency-based versus time-based curriculum	8	14.3%						
Create a D.D.S.-Ph.D. track	9	16.1%						
Create more research opportunities for students	27	48.2%						
Increase educational collaborations with other campus schools	29	51.8%						
Provide more curricular emphasis on medical problems	27	48.2%						
Provide opportunities for students to use evidence-based dentistry	29	51.8%						
Establish group practice teams in clinic	8	14.3%						
No response	4	7.1%						

percent), and increasing the budget for curriculum development (54 percent).

Respondents were asked whether at least three faculty vacancies existed at their schools (Table 12). Forty-two schools answered yes to this question (75 percent). However, 90 percent of respondents reported that they *did not* see a need to restructure the

curriculum in the short term because of faculty shortages.

Finally, when respondents were asked to indicate whether the efforts of ADEA or other organizations could positively influence changes in the curriculum at their dental school, 93 percent answered yes (Table 13). Table 14 indicates curriculum-related

**Table 10. Reasons why faculty and/or administration may be considering curricular changes (respondents were requested to select all items that applied) (N=56 dental schools)**

Response	n	Percent	0	20	40	60	80	100
Faculty are dissatisfied with the educational program	15	26.8%						
Administration is dissatisfied with the educational program	24	42.9%						
Students' criticism of the curriculum	21	37.5%						
Results of a recent accreditation site	6	10.7%						
Results of a recent internal curriculum review	19	33.9%						
Changes elsewhere in the university	14	25.0%						
The need to attract applicants	15	26.8%						
To compete with other schools in our region	1	1.8%						
Recognition that we need to make better use of resources	33	58.9%						
Alumni feedback/recommendations	27	48.2%						
Recommendations of consultants	9	16.1%						
Take advantage of opportunities created by new facilities	8	14.3%						
Take advantage of grant opportunities	8	14.3%						
The need to incorporate new scientific findings	30	53.6%						
Need to present curriculum with fewer faculty	12	21.4%						
No response	0	17.9%						

initiatives by ADEA or other organizations that were perceived to be helpful by a majority of respondents including: distributing curriculum models from schools with innovative approaches (84 percent), conducting national or regional conferences to stimulate curriculum innovation (78 percent), distributing curriculum best practices (71 percent), provide funding to promote research on the effectiveness of curriculum strategies (63 percent), and publish manuscripts on curriculum change (63 percent).

Survey responses from the eight Canadian schools were compared to the forty-eight U.S. schools. Overall, there were differences between Canadian and U.S. schools in only a few areas. U.S. schools reported more interest in creating D.D.S.-Ph.D. programs, expanding instructional technology/web-based learning, and expanding research opportunities for students. A higher percentage of Canadian schools reported that they had at least three vacant faculty positions. Neither U.S. nor Canadian

respondents reported much interest in distance learning or creating articulation agreements with other schools to allow students to take courses and transfer the credits to dental school.






Virtually all respondents provided write-in comments to amplify their responses. These write-ins were transcribed verbatim and analyzed for key themes. Three key themes emerged from this analysis. First, nearly half of the respondents described efforts to move toward more interdisciplinary curricula but observed that the process is “slow and difficult,” “departments remain territorial,” and “change is a slow and humbling process.” Second, some respondents said that their schools had implemented many of the innovations years ago and thus these changes were “not new anymore” for them, a factor that should be considered in analyzing the survey results. For example, several respondents commented that PBL hardly qualifies as a “new” innovation because it has been around since the 1960s. Third,

**Table 11. Resources responding schools believe are needed to make the planned curricular changes (respondents asked to check all that apply) (N=56 dental schools)**



Response	<i>n</i>	Percent	0	20	40	60	80	100
Faculty development related to curriculum	49	87.5%						
Individual(s) with protected time to manage change	33	58.9%						
Educational consultant(s) to work with faculty	27	48.2%						
Provide key course directors with protected time	29	51.8%						
Modifications to our physical plant	25	44.6%						
Expansion improvement of information technology capability	33	58.9%						
A budget to develop new educational materials	31	55.4%						
Budget support for planning retreats	21	37.5%						
Funds to support visits to other dental schools	15	26.8%						
No response	3	5.4%						

**Table 12. Faculty vacancies at responding schools**

**At the present time, do you have at least three faculty vacancies?**  
(N=56 dental schools)

Response	<i>n</i>	Percent	0	20	40	60	80	100
Yes	42	75.0%						
No	13	23.0%						
No response	1	2.0%						
<b>Do you envision a need to restructure the dental curriculum in the short term because of faculty shortages?</b> (N=56 dental schools)								
Yes	6	10.0%						
No	50	90.0%						
No response	0	0.0%						

**Table 13. Schools' perception of whether efforts of ADEA or other organizations could positively influence changes in the curriculum at their dental school**  
(N=56 dental schools)

Response	<i>n</i>	Percent	0	20	40	60	80	100
Yes	51	91.1%						
No	5	8.9%						
No response	0	0.0%						

nearly one-third of the respondents reported that their schools had just started a significant restructuring or were already in transition to a modified curriculum that will take several years to fully implement.

## Discussion

The goals of this survey were to characterize the shape and scope of curricula of North American dental schools, to identify curriculum evaluation strategies, and to report curriculum modifications

recently incorporated as well as changes anticipated by the academic deans. Results are analyzed in relation to the dental school reform agenda. Table 15 summarizes our interpretation of the degree of implementation of these reforms based on the findings of this survey. The first item on the reform agenda, competency-based education, cannot be addressed because there were no questions on the survey related to this reform.

In considering this “report card,” we can make some broad generalizations about the current dental curriculum and future curricular directions at a ma-

**Table 14. Percentage of respondents who endorsed various ADEA initiatives to support curriculum change at dental schools (respondents were requested to select all items that applied) (N=51 dental schools)**

Response	<i>n</i>	Percent	0	20	40	60	80	100
Distribute curriculum “best practices”	40	71.4%						
Distribute curriculum models from schools with innovative approaches	47	83.9%						
Strengthen accreditation guidelines to require “best practices”	8	14.3%						
Conduct national and regional conferences	44	78.6%						
Publish monographs and special reports on curriculum change	35	62.5%						
Provide funding promoting research on effective curriculum strategies	35	62.5%						
Devote more sessions at the annual meeting to curriculum reform	39	59.6%						
Commission expert panels to create “ideal” curriculum models	18	32.1%						
No response	6	10.7%						

majority of North American dental schools. It appears that there is recognition that decompression of the dental curriculum has to occur. A high percentage of respondents to this 2002 survey reported that they had already made efforts to decompress the curriculum, and a majority of schools desired to accomplish even more decompression in the future.

During the annual Curriculum Forum at the 2004 ADEA Annual Session, more than 100 dental educators, including many deans and associate deans for academic affairs, were asked this question: what is your top priority for curriculum innovation? The overwhelming answer: decompress the curriculum. Thus, it appears that the decades-long drumbeat of criticism about the overly dense dental school curriculum has captured the attention of educational leaders in dental schools. However, in our experience, the essential first step in curriculum decompression is to forget about the word “decompression” and instead focus on the task of making thoughtful decisions about curriculum focus and content versus

emphasizing reduction in time (contact hours). Unfortunately, efforts to reform curricula by faculty-centered decision-making processes often fail due to entrenched turfdom or faculty reluctance to be critical of their colleagues. As a result, deans are often tempted to employ a draconian strategy by mandating an across-the-board reduction in clock hours that applies to all departments and all courses. Taxing departments equally is a relatively conflict-free decompression strategy that allows all departments to be equally unhappy and thus reduces curriculum warfare between departments (i.e., departments can direct their hostility toward the dean, not each other). However, this approach to decompression often does little to help dental schools make fundamental decisions about the philosophy and focus of their educational programs.

The critical question for leaders in dental schools is: how can schools make informed decisions about the focus and content of the curriculum without getting bogged down in divisive curriculum poli-

**Table 15. Report card: progress on dental school curriculum reform agenda**

Curriculum Reforms	2002-03 Curriculum Structure and Innovations Survey Data	Progress Report Card
1. Redesign curriculum to incorporate competency-based learning principles and evaluation methods.	Not assessed by survey	N/A
2. Decompress curriculum by eliminating outdated and peripheral material.	79 percent reported decompression efforts already undertaken, and 55 percent reported plans for future decompression.	High priority for most schools
3. Increase educational collaboration between dentistry and other health professions, featuring more curricular emphasis on interaction of dental and medical problems.	64 percent reported increased emphasis on dental-medical systemic interactions in past three years. 55 percent reported increased collaboration with allied health, medical, nursing, and other health professions schools in past three years. 52 percent desire to increase future collaborations with other health education programs.	Many schools moving in this direction
4. Redirect basic science coursework toward disease pathophysiology taught by problem-based techniques.	Only 5 percent of schools employ PBL as the primary learning method, but one-third reported some use of case-reinforced learning. Most school curricula (85 percent) are discipline-based. Only 7 percent reported interdisciplinary themes as curriculum structure. Anecdotal reports of efforts to move toward interdisciplinary teaching that have been resisted.	Data does not directly address disease pathophysiology, but indicates PBL and interdisciplinary teaching are not widely adopted.
5. Expose students to patients' oral health and systemic medical problems from first days of curriculum.	84 percent reported efforts to increase freshman and sophomore student exposure to patients and the clinical environment.	High priority for most schools
6. Revitalize science of clinical decision making with evidence-based approaches.	75 percent reported that they have already expanded learning opportunities for evidence-based dentistry (EBD), and more than half would like to increase EBD focus in the next three years.	Many schools moving in this direction
7. Organize group practice teams to promote continuity in faculty-student relations and expand peer teaching.	52 percent reported they had created group practice teams, and 14 percent would like to create teams in next three years. Other schools said they created clinic teams many years ago and thus did not report as a "new" innovation.	Reform already implemented by virtually all dental schools
8. Increase use of community-based clinics as training sites for students.	64 percent reported that their students have a required community-based patient care rotation. 54 percent desire to increase community-based education.	Many schools moving in this direction
9. Include experience in final year or in postgraduate internship year that replicates comprehensive care environment of the general dental practitioner.	70 percent have already created a senior year comprehensive care experience; an additional 23 percent would like to create comprehensive care experiences in the next three years.	A senior year comprehensive care experience is a high priority for most schools.
10. Use information technology to enrich student learning.	86 percent have expanded use of instructional technology (IT), and most schools (82 percent) have additional plans for further IT expansion.	Already implemented by virtually all dental schools
11. Rededicate school clinics to serving oral health needs of patients rather than viewing patients as educational material for students.	Not assessed by survey	N/A

tics? Related questions include: What content should be discarded completely? What should be kept in the curriculum, but with reduced or different emphasis? What should be kept as is? And what areas should be expanded? Dental faculty experienced in curriculum planning know that these decisions are often conceptualized in terms of “our turf” versus “their turf” leading to Balkanization of positions and accompanying loss of perspective.

Respondents to the survey reported in this article and respondents to previous surveys about the process of curricular change describe the tortuous and emotionally laden path to educational reform, especially when it is pitched as “modernization.”<sup>11-13</sup> In our experience, the following statement sums up the typical reaction of the faculty to a modernization message: “If you’re asking us to modernize, you must be telling us that we are outdated. Oh yeah? Says who?” Providing an answer for the “says who” question is critical to building a curriculum that meets the current and future health care needs of the public and the training needs of dentists who provide these health care services. One strategy to answer the “says who” question is to provide an external standard, or benchmark, against which curriculum content and areas of emphasis can be compared.<sup>14</sup> The goal of using an external standard is to move the discussion of what should be learned by our students beyond the “us versus them” logjam toward the question: how can we make the best informed decisions about preparing our students for entry into professional practice? Four strategies for answering the “says who” question are described in the following section: 1) curriculum prioritization hierarchies, 2) future forecasting, 3) review of curriculum advocacy in the literature, and 4) the ideal curriculum committee.

*Curriculum Prioritization Hierarchies.* For more than thirty years, the World Health Organization has advocated that curriculum content and time should be prioritized according to a hierarchy where health problems that contribute most profoundly to public morbidity and mortality are addressed the most aggressively in the curriculum.<sup>15</sup> In other words, diseases, environmental conditions, sources of injuries, and high-risk health-related behaviors that represent the most widespread threat to the overall health of society should receive the most attention in the curriculum. Although the WHO model has undergone many tweaks over the decades, the fundamental hierarchy has seven layers: 1) diseases, environmental

conditions, sources of injuries, and high-risk behaviors that are direct causes of mortality, in order of incidence, within the scope of care of a particular health care discipline; 2) diseases, conditions, injuries, and behaviors that contribute to chronic, long-term morbidity and loss of function (in order of incidence); 3) knowledge and skills that health care providers need to perform assessment, prevention, and educational services within their scope of responsibilities; 4) acute but short-term or self-resolving illness that do not typically produce significant mortality or long-term disability; 5) special services needed for underserved populations and other populations with specific needs; 6) health care services primarily designed for improvement of quality of life; and 7) health care services primarily designed for improvement of personal appearance.

The Healthy People 2010 report can also be used as a source of information to create a prioritization hierarchy specific to oral health. Healthy People 2010 contains eighteen specific oral health objectives under the general oral health goal of “to prevent and control oral and craniofacial diseases, conditions, and injuries and improve access to related services.”<sup>16</sup> These oral health objectives are listed in order of societal health impact in a hierarchy roughly similar to the WHO system starting with “deaths from oral and pharyngeal cancer” followed by untreated dental decay, permanent tooth loss, destructive periodontal disease, early detection of oral and pharyngeal cancer, and prevention by application of dental sealants among some of the priority items.

*Future Forecasting.* The Delphi Technique is used to ensure that academic programs are future-oriented and “on the cutting edge” in relation to public needs and the advance of science.<sup>17</sup> During a curriculum delphi process, experts who represent all facets of the profession forecast new competencies that practitioners will need to respond to the public’s health needs and service expectations in the future. The delphi method is conducted by mail or email so the panelists do not meet face-to-face. This is done so that force of personality does not come into play in the forecasting process. The initial set of forecasts is tabulated and distributed to the panel members who rank-order the items and add others not initially proposed. This process is repeated several times with each successive round depending on responses from the previous round. Consensus on item priority is usually reached after three to four rounds, and the

results can then be fed to a task force charged with developing strategies to introduce new cutting-edge competencies into the curriculum.

*Review of Curriculum Advocacy Recommendations in the Literature.* Comparing the curriculum to recommendations for educational priorities that appear in the literature is another way to provide an external standard that can encourage faculty to focus on the schools' overall graduating "product." This can be accomplished by conducting a scan of the curriculum advocacy literature. The first step is to identify journals devoted to educational strategies pertinent to the profession or that routinely include articles and commentaries on educational issues. The second step is to tabulate the number of articles, typically going back three to five years, where the authors argue for inclusion or expansion of specific topics, issues, and activities in the curriculum. For example, over the past three years, fifty-three topics have been the subject of curriculum advocacy articles published in the *Journal of Dental Education*. The list below indicates the top ten topics and issues advocated by the authors of these articles for inclusion or increased emphasis in the dental school curriculum. The number of advocacy articles is indicated in parentheses.

- Smoking cessation/health risks of tobacco (fourteen)
- Dentistry's contract with society/importance of making graduates and current practitioners aware of the need to reduce disparities in oral health care (fourteen)
- Children's oral health/early childhood caries (twelve)
- Preparing dental school graduates to use information technology for office management and patient care (twelve)
- Educational value of community-based learning (eleven)
- Advances in genetics and molecular biology (ten)
- Ethics and professionalism (seven)
- Cultural competence (six)
- Tissue engineering (six)
- Craniofacial pain (six)

*Ideal Curriculum Committee (ICC).* Departmental autonomy, faculty comfort with existing routines, and reluctance to criticize colleagues can block efforts to revise the curriculum via peer review strategies, particularly when fundamental redirection is indicated. In this situation, using the ideal curriculum committee strategy may help focus attention on

analyzing the merits of a new model of education, divert attention away from defending "the way we've always done it," and provide a structure for managing curriculum revision with sensitivity to organizational, political, and communication issues.<sup>18</sup>

How does an ICC work? Prior to the formation of the ICC, a broad-based faculty committee identifies curriculum problems that require more than transient "band-aid" solutions. Using this report as a catalyst, the dean appoints an interdisciplinary committee of respected teachers, well recognized for their ability to see beyond discipline-based boundaries, to develop an "ideal" curriculum model that will alleviate recognized educational problems and provide a new direction for the school. Sometimes, ICC members are nominated by the faculty, and this group also includes community practitioners and students. The goal of the ICC is to break the "we win, you lose" mindset by providing all constituencies in the dental school with a new curriculum model that is not closely linked to the philosophy of any one department or influential opinion-leaders among the faculty. The ICC model should be a comprehensive multiyear plan that can be reviewed as a single entity rather than a series of system tweaks (situation-specific fixes). This model is presented to departments for review, and schoolwide faculty forums are conducted to explain the plan and elicit suggestions. Feedback from these reviews is incorporated to produce a refined version that is unveiled at a schoolwide retreat for further debate. After modifications stimulated by the schoolwide retreat, the ICC plan is then sent through the school's educational decision-making hierarchy for consideration, modification, and approval. Ideally, the unveiling of an ideal curriculum model and the ensuing debate about its merits will energize faculty and students and focus attention on the big picture question: what is the best way to prepare our students for entry into the world of dental practice?

In addition to decompression and strategies for approaching this formidable task, a second notable survey finding is that problem-based learning (PBL) is not perceived to be a viable curriculum format for dental schools, or at least schools have not been able to implement it. Only three schools (5 percent) reported that PBL was their primary curriculum format. However, schools that employ a PBL format continue to report positive outcomes about their programs.<sup>8,19,20</sup> Among survey respondents, case-related (CRL) or case-supported teaching is used more than

PBL, with 36 percent of the responding schools reporting “some courses use CRL for entire course; however, most are lecture-based.” In addition, an interdisciplinary or thematically organized curriculum does not appear to be a curriculum model that can be easily implemented in dental school. Only four schools reported that their curriculum was organized around themes of interrelated topics. Adoption of a PBL structure and breaking down traditional departmental barriers to create an interdisciplinary curriculum are undoubtedly among the most challenging curriculum changes that can be attempted and are likely to be met with the resistance previously described.

As we think about other generalizations that could be made about the current state of the clinical curriculum at the majority of responding schools, the timing of clinical experiences, the structure of clinical practice models, and the incorporation of community-based activities must be considered. It appears to be a high priority at many schools to expose students to patients’ oral health needs and systemic medical problems early in the curriculum (84 percent of schools). Also, if we look at items already incorporated into responding schools’ curriculum in the past three years, nearly 70 percent reported creating a substantial comprehensive care experience in the senior year, and 52 percent reported that they had established group practice teams in the clinic. Much has been written about how these models can facilitate patient-centered care<sup>21</sup> and lead to increased productivity.<sup>22</sup> However, according to some of the respondents, these models have been in place so long that they did not consider them recent innovations. Finally, a majority of schools are requiring students to provide community-based patient care.

The most often selected curricular innovation already incorporated into the curriculum in the past three years was “increased use of computer-based technology” (86 percent of schools). In looking at what is planned for the next three years by responding schools, 82 percent projected an increased use of computer-based technology. While the focus on computer-based technology stood out, a separate question about distance learning revealed that few schools have incorporated off-campus learning capacity into their programs during the last three years (5.4 percent), and a modest 10.7 percent identified “providing distance learning opportunities” as a curricular innovation they were planning in the next three years. These findings showing limited interest

in distance learning are in contrast to survey data recently reported by Andrews and Demps.<sup>23</sup>

Some of the most surprising responses to the survey questions related to faculty vacancies and whether faculty shortages will require that the curriculum be restructured. While 75 percent of the respondents reported that there were at least three faculty vacancies at their schools, when asked whether the respondents envisioned a need to restructure the dental curriculum in the short term because of faculty shortages, 90 percent of them answered “no.” In a review of data from ADEA’s 2001-02 survey of vacant budgeted faculty positions,<sup>24</sup> approximately one out of four dental schools actually has ten or more vacancies, with the prospects for decreasing vacancies gloomy. It will be interesting to see if the optimistic response about the relationship between the need for curricular restructuring and faculty vacancies will change as shortages are projected to increase.

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## Conclusions

Overall, respondents reported that their schools were making strong progress toward implementing many of the items on the dental school reform agenda that appears in Table 1 with two notable exceptions: interdisciplinary curriculum organization and use of problem-based learning. Approximately two-thirds of the respondents of this survey defined their current curriculum organization and presentation as largely discipline-based with a few interdisciplinary courses. While some schools reported that they used PBL and CRL in certain areas of the curriculum, only three schools (5 percent) indicated that all of their courses used the PBL format. Regarding integration of major sections of the curriculum, a very low percentage (7 percent) reported that their entire curriculum was organized around themes of interrelated topics. The overwhelming majority of responding schools reported that their students had required community-based clinical treatment experiences. While a high percentage of the responding schools had at least three vacant faculty positions, nearly all reported that they did not envision a need to restructure the dental curriculum because of faculty shortages. The results of this study help to broadly describe the current structure and format of the dental curriculum at North American dental institutions.

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