In the Students' Own Words: What Are the Strengths and Weaknesses of the Dental School Curriculum?

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Abstract: Dental students have little input into the selection of course topics and subject matter included in their dental curricula. Curriculum requirements are framed by the Commission on Dental Accreditation, which has stipulated competencies and associated biomedical and clinical knowledge that must be addressed during dental school. Although these competency requirements restrict the variance of educational experiences, students are eager to share their views on the curriculum within the realm of their educational experience. The objective of this research project was to elicit the perspectives of dental students from a broad cross-section of U.S. and Canadian dental schools about their education. A total of 605 students (285 sophomores, 220 seniors, 100 residents) from twenty North American dental schools completed a SWOT (Strengths, Weaknesses, Opportunities, and Threats) analysis to communicate their perceptions of the curriculum. Students were also asked to provide their impressions of the overall quality of the educational program in an open-ended written format. The students' qualitative comments were then reviewed and categorized into key issues or themes. Resulting themes for each category of the Curriculum SWOT (C-SWOT) analysis were the following. Strengths: 1) clinical learning experience, and 2) opportunity to work with knowledgeable faculty. Weaknesses: 1) disorganized and inefficient clinical learning environment, 2) teaching and testing that focus on memorization, 3) poor quality instruction characterized by curricular disorganization, and 4) inconsistency among instructors during student evaluations. Opportunities: 1) develop strategies to provide students with more exposure to patients, especially early in the curriculum, and 2) opportunities to learn new technology/techniques. Threats: 1) cost of dental education, 2) students' concerns about faculty "brain drain," i.e., lack of sufficient numbers of dental faculty capable of providing high-quality instruction, and 3) questionable treatment of patients in the dental clinic as a consequence of pursuing procedural requirements. This report presents commentaries selected from 2,421 total responses that communicate students' perspectives related to C-SWOT themes. Students at seven schools in this study reported that they completed all or portions of the first two years of the curriculum in combined classes with medical students. Sophomore and senior students at these schools provided their thoughts on this curricular approach; these perceptions are also reported. Findings from this study are compared to results from a similar investigation of dental student perceptions conducted fifty years ago. We conclude that students participating in this study were positive overall about their learning experiences in dental schools, but identified several areas that appear to be problematic for many students at a variety of different schools including fundamental concerns about instructional quality in some areas of the curriculum. Academic program administrators in dental schools can use these findings to guide modifications that will enhance the overall dental education experience.

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The importance of including student input in education is accepted as a key component of processes used to monitor the quality of academic programs. Students complete course evaluations, end of year surveys, competency self-assessment surveys, and a number of other instruments designed to gauge impressions of their educational experience. For teachers, evaluation is a means for making educational decisions: are students prepared for the course as planned; at what level should the material be presented; is the progress of the course too rapid or too slow?[1] Evaluation provides insight

into course and teaching effectiveness. Effective evaluation provides valuable information, which contributes to both student and course success.

Following the completion of these evaluations, what happens to the information? The hope, at least from the student's perspective, is that substantive changes are implemented from this information. Unfortunately, dental schools tend to focus the microscope on passing rates on standardized tests rather than students' perceptions of their education.[2] The purpose of this study was to examine students' perceptions of their curriculum by using a different type of evaluation tool: a SWOT analysis.

Students' views of particular courses and instructors are frequently shared from one graduating class to another. Students are often surprised to learn that comments placed on faculty evaluations or surveys do not affect the course from one year to the next. Simply put, the information provided in evaluations is oftentimes not used to modify curricular content. Unfortunately, faculty unwillingness to listen to student comments, or make modifications based on this feedback, eventually leads to students' frustration with the academic program, which could turn into a feeling of frustration toward the profession of dentistry.[3] This study was designed to provide students with a "louder voice" by which they can share their perceptions about the dental school curriculum.

A SWOT analysis (**S**trengths, **W**eaknesses, **O**pportunities, and **T**hreats) was implemented to identify dental students' views on their education.[4] The SWOT assessment technique was originally developed as a planning tool in the private sector to help businesses with program monitoring and goal setting.[5] Previous studies have successfully used SWOT analyses in areas outside of the business setting. The SWOT analysis has been used, for example, to identify areas that would enhance the learning environment for medical and dental students in the clinical setting.[5,6] Similarly, Burke et al. used a SWOT analysis to identify the feasibility of implementing practice-based research in private dental practices.[7] Others have used this planning tool to measure public oral health services in Europe.[8] In our study, the methodology of employing a SWOT analysis in combination with qualitative research was used to better understand the dental school learning environment by placing emphasis on the experiences and perspectives of students.

The Curriculum SWOT (C-SWOT) is the third and final instrument used in the Student Perspective Project (SPP). The SPP was designed to explore the learning environment in dental schools in North America by requesting feedback from the consumers of the educational product: the dental students. The first two instruments used for the SPP—the Dental Student Learning Environment Survey (DSLES) and the Clinical Education Instructional Quality Questionnaire (ClinED IQ)—addressed issues associated with dental student perception of the overall dental school experience and clinical education.[9,10]

The C-SWOT questionnaire (Curriculum Strengths, Weaknesses, Opportunities for improvement, Threats to program quality) required dental students to communicate their impressions of the overall quality of the educational program and to make recommendations for improving the dental school curriculum.

The dental students were asked to write responses to four questions:

1. What have been the *strengths* of your dental education so far?
2. What have been *weaknesses* in your dental education so far?
3. What were the *opportunities for improvement* that would most dramatically enhance the quality of the dental education experience for you and for future students? In other words, what are areas of "untapped potential" that the dental school should work to enhance in the future?
4. What are the *threats to the quality* of dental education that need to be addressed so dental school (and dentistry as a career option) remains attractive to college students making decisions about professional careers?

Methods

To gain an appropriate cross-section of dental students, sophomores, seniors, and students in postgraduate dental programs were identified as subsets of the overall dental education population who could provide unique perspectives on the curriculum. The graduate students who participated in this study were recent graduates from that particular dental school who were now in the dental residency programs at that institution and could look back over their experiences there. The SWOT analysis was used for this study in the hopes that open-ended comments provided by the students would provide a set of rich and detailed data reflecting students' personal perspectives, which could then be reviewed and analyzed for definite themes that illustrate students' views on the strengths and weaknesses of their dental curricula.

An invitation letter was sent to the associate dean for student affairs in each North American dental school in the spring of 2002. This letter discussed the background and goals of the project as well as requirements for participation and timetables for completion. Of the sixty-five dental schools in North America in 2002, twenty-three (35 percent) originally agreed to participate in the study. Project materials were sent to the associate dean for student affairs of these schools for distribution. The materials included copies and background information on the C-SWOT, a C-SWOT Frequently Asked Questions (FAQ) list, University of Texas Health Science Center at San Antonio Institutional Review Board (IRB) information sheet, and directions for the distribution and completion of the C-SWOT. Twenty of the twenty-three schools complied with the protocol and returned C-SWOTs from their students. The twenty schools represented 31 percent of the North American dental schools in operation at that time. The names of the participating dental schools and the total number of students who participated at each school are provided in Table 1.

Students were recruited at the discretion of the associate dean for student affairs at each dental school by email, phone, or personal solicitation. Students were then provided a copy of the C-SWOT, instructions for completion, and the University of Texas Health Science Center at San Antonio IRB form. Completed C-SWOT questionnaires were submitted to the Office of Student Affairs, compiled, and returned for analysis. The students' extensive written comments, which totaled approximately 2,400 individual entries, were analyzed using qualitative methodology described by Denzin and Lincoln to identify a series of frequently expressed key issues or themes.[11] The themes were further refined and clarified using the framework analytic approach.[12] The framework approach is based on grounded theory of data analysis in which themes are generated from data. It is based on original personal written comments. The framework approach is also systematic and comprehensive and allows a full review of the material collected. Analysis was conducted until no new themes emerged and data saturation was complete.

Identification of themes was completed by the lead author with assistance from staff of the Division of Educational Research and Development at the University of Texas Health Science Center at San Antonio who have experience in qualitative methodologies. In the analysis of data, key issues were identified by the frequency of student comments related to specific subjects. Therefore, the most prevalent themes will be described for each section of the four sections of the SWOT.

Table 1. North American dental schools that completed the C-SWOT and number of respondents from each school

School	DS II	DS IV	Grad
University of Southern California	15	12	4
University of Connecticut	15	14	10
University of Georgia	15	20	11
Tufts University	15	15	11
University of Mississippi	3	10	5
University of Missouri-Kansas City	8	5	6
Creighton University	15	15	0
University of Nevada, Las Vegas	27	0	0
State University of New York at Buffalo	12	6	6
Columbia University	16	15	11
University of Oklahoma	8	1	0
University of Oregon	15	14	6
University of Pittsburgh	24	8	2
University of Texas Health Science Center at San Antonio	16	5	10
Marquette University	16	12	0
University of British Columbia	10	9	0
University of Toronto	5	4	1
McGill University	0	9	8
University of Saskatchewan	14	15	0
State University of New York at Stony Brook	32	31	9

Results

A total of 2,421 comments were received from three groups of students (DS2: 1,185, DS4: 842, and Residents: 394). The distribution of all student comments for each component of the C-SWOT is listed in Table 2. The following section identifies the most commonly described themes for each component of the SWOT analysis: strengths, weaknesses, opportunities, and threats. Following the description of the prevailing themes, direct quotes from students' responses are presented to illustrate the nature and focus of students' perceptions in that particular C-SWOT category. Analysis of the large volume of student comments elicited by the C-SWOT revealed student perceptions were generally similar among sophomores, seniors, and recent graduates who entered dental residency programs. Except for one area described below, the data is not reported according to the different classifications of students; instead, pooled data are described for each of the C-SWOT categories. The one area that elicited marked differences in responses between underclassmen and upperclassmen was students' perceptions of the combined dental and medical school basic science curricula at seven of the schools in this sample. Consequently, sophomore and senior responses are distinguished in the reporting of results related to the student impressions of a combined dental-medical curriculum.

Frequently Expressed Curriculum Strengths

Students answered this question: what have been the *strengths* of your dental education thus far? Consistent with findings from the previous ClinEd IQ study (Clinical Education Instructional Quality),[10] the majority of dental students completing the C-SWOT indicated that the opportunity to work closely with experienced dental practitioners in the preclinical and clinic settings was the strongest part of their dental education. The old adage "teachers make the academy, for better or worse" appears to reflect the opinions of dental students at these twenty schools with emphasis on "for better," although as reported below, students also perceived "for worse" among some of their instructors. Students were clearly able to recognize and describe instances of outstanding course implementation, and especially clear organization of subject matter, which appeared to be far more common than inadequate learning experiences. One student characterized effective courses and instructors as follows:

> The strongest courses in dental school were very clear about what they expected students to know. Organization was important in lecture courses. Histology, for example, progressed from topic to topic keeping a general flow and direction that made everything tie together. Head and Neck Anatomy had a similar structure; first we talked about a muscle, then the nerve that supplied the muscle, and then the blood vessels associated with that area, and so on. The reason these courses were so strong is because instructors were very straightforward about the information we were to learn, the depth at which we were to learn it, and their tests reflected the points that were the focus of classes. The best instructors had a genuine concern for the students. They understood that answering questions and clarifying material were more important than making sure we stayed exactly on task. These instructors were very approachable, welcomed questions, and were honest in their responses.

Table 2. Number of C-SWOT responses for each questionnaire component

Component	Sophomore	Senior	Resident	Total
Strengths	300	219	99	618
Weaknesses	303	219	100	622
Opportunities	298	204	99	601
Threats	284	200	96	580
TOTAL	1,185	842	394	2,421

The following direct quotes from dental students participating in the C-SWOT study illustrate their perceptions of the predominant strengths of their educational experience, organized into main themes.

1) Preclinical and Clinical Experience

"It is great that we have been able to work in the clinic already [sophomore student]. It helps me to learn material in preclinical courses better when I can take an hour or two to try to use the information practically. These are my most memorable learning experiences in dental school so far. I feel like I am actually learning something when we give each other injections, cleanings, scalings, etc."

"I am very happy with our introduction to clinical experience (ICE) class. I believe that it is one of our greatest strengths. Because of these classes I am confident and very motivated to start my clinical experience."

"I think that the number of clinic hours has been a tremendous strength of my dental school experience. It has afforded me the opportunity for many patient encounters and many clinical situations."

"We have a very comprehensive curriculum with diverse faculty and staff. There are several experts in the different specialties of dentistry. We have the ability to work at dental clinics outside the school (children's hospital, area hospital). Our rotation schedule exposes us to different experiences."

"One of the biggest strengths has been the amount of time spent in the clinic. Compared to most schools, we receive a great deal more clinic time. This allows us to develop our patient skills and hands-on skills."

2) High-Quality, Knowledgeable Faculty

"The strength of my dental education has been to learn from teachers who really care about the profession. Most of the teachers here are really great at their jobs and really want you to learn."

"We have great teachers—clear and want to impart their knowledge, experiences, and techniques in an encouraging way. We were not spoon-fed, but well guided."

"Being in clinic with professors who will offer suggestions and will demonstrate corrections that need to be made to the current treatment of the patient without doing it for me."

"The strengths so far have been the few doctors/professors and postgraduate students I have had an opportunity to meet. These individuals have made an impact despite all the 'doctor' titles, names, and other impressions. They have shown initiative to reach out to students in the clinics and in classrooms."

"The quality of the professors has been a strength because good teachers make their subject matter easy to learn and their enthusiasm makes the educational experience that much better."

"Quality of the teachers: I feel like I am part of a community—friendly, understanding care, supportive."

Frequently Expressed Curriculum Weaknesses

Students answered this question: what have been *weaknesses* in your dental education so far? The students identified four major areas of concern about their dental education: 1) lack of efficiency and resultant unproductive time in the clinical environment; 2) instructional strategies of some faculty who emphasized teaching and testing for memorization; 3) interactions with a segment of the faculty who exhibited poor teaching methods and/or poor attitudes; and 4) a widespread perception of inconsistency among instructors during assessment of student performance (comprising feedback, ratings, and grades).

Overall, 30 percent of all comments written in response to the question about curriculum weaknesses identified clinic inefficiency as a major barrier to learning, and thus represented the students' most significant concern with their dental education alongside student concerns about the impact of "requirement-seeking" on patient care, an issue that will be addressed in the section on threats. A substantial percentage of the students' comments about curricular weaknesses (20 percent) described how faculty approached their teaching assignments by focusing excessively, from the students' perspective, on factual memorization in both course content and evaluation of students' learning. Approximately 20 percent of the descriptions of program weaknesses addressed various examples of what students considered to be "poor teaching and/or inappropriate teacher attitudes," and another 20 percent described perceived inequities in grading with an emphasis on lack of consistency among faculty. It is important to note that intermingled with a high percentage of the student observations about these four curricular weaknesses were commentaries about lack of organization either by instructors individually or throughout an entire course, which were persistently mentioned as being hand-in-hand with other elements of undesirable teaching technique.

The following direct quotes from dental students participating in this study illustrate their perceptions of the predominant weaknesses of their educational experience. These are organized into themes.

1) Lack of Efficiency and Resultant Unproductive Time in the Clinical Environment

"A major problem is dental students have to worry about many things outside of their control such as patient scheduling, lab work, completing requirements, which leaves little time for learning. More than half of the students' time in the third and fourth years is spent doing nonlearning activities. Students worry about getting things done or 'signed-off' by faculty and don't take time to learn what they are doing."

"Too many students and too few chairs. Departments do not communicate with each other, leaving the student stuck in the middle. TOO MUCH RED TAPE! More jumping through hoops and filling out paperwork than actually doing procedures and learning."

"Unbelievable shortage of preclinical faculty affects morale of professors and limits students to tremendous extent; 20 to 1 student/faculty ratio in fixed prosthodontics is outrageous."

"So much time is wasted in this clinic on things like changing encounter forms, getting new burs, organizing patients, scheduling, and searching for patients. There has to be a way to run things more efficiently."

Descriptions of student frustration and ethical concerns about patient management strategies related to acquiring procedural requirements were intertwined with many accounts of clinic inefficiency. Students' perceptions of the influence of requirement-seeking on interactions with patients, stress, and quality of learning experiences are addressed in the section devoted to curriculum threats.

2) Instructional Strategies of Faculty Who Emphasized Memorization in Their Teaching and Testing

"Some of our biomedical courses could be taught in a way that emphasized more understanding of the material instead of memorization and regurgitation on multiple choice exams (yuk)."

"Our curriculum falls short in addressing applicable learning that requires more open-ended thought, conceptual learning, and applied instruction. We see the steps, but not the staircase."

"For the majority of time we just memorize material, which is never applied and is soon forgotten. Hard to get an overall concept of why we learn or do a certain thing."

"The basic sciences here are focused on teaching us to pass exams. There is little encouragement of creative, innovative thought. Only two instructors I know of in this school have the energy to use an open-ended style format to really test what we know."

"Tough courses were just taught to memorize for the purpose of board exams; without knowing the reasons or mechanisms behind something, it is difficult to learn and internalize."

"I get really burned out. I feel like I'm just cramming for tests and then the information is gone."

"There is a lack of real teaching in the didactic courses. Lots of material is presented, but no helpful way to remember the information is shared."

As previously noted, observations about what students perceived as poor teaching were often accompanied or augmented by a secondary comment about lack of organization or obvious failure of departments to communicate with each other, leading to confusion and redundant instruction. The following examples of C-SWOT responses illustrate student emphasis on organization and clarity and their disappointment that these qualities were not always present in their education:

"The manner in which some courses are presented seems unorganized or even scattered with no real goal or purpose. It seems they just want to get as much information out as possible."

"Lack of interdepartmental communication leads to lapses of educational topics and redundancies."

"Each department has its own way of grading, setting competencies, designating thresholds, etc. As a new student coming into the clinic, it is quite overwhelming."

"Basic sciences (i.e., Microbiology and Pathology) need to be more integrated with the courses in clinical dentistry. At times, instructors themselves have no idea (no kidding!) why a particular topic is being taught!"

"There is too much overlap of very basic details and procedures. This takes up valuable time that could be spent clarifying ambiguous details in class. There is not enough time spent on procedures like scaling and root planing and prophy, while concepts like plaque scores and pocket depths, which can be learned much quicker, are repeated ad nauseam."

"The dental classes are disorganized, not taught well, and a majority of them are taught without a laboratory component (i.e., oral surgery and local anesthesia), making it difficult to actually understand what we are being taught and how we will be applying it clinically."

3) Interactions with Faculty Who Exhibited Poor Teaching Methods and/or Poor Attitudes

"I get the impression that many of our lecture professors are 'out to get us.' As ridiculous as that may sound, it seems like the goal is not to help us learn but to confuse and trick us. I do well in school, and I feel like I could have learned most of the material on my own more effectively than by attending lectures and taking exams from professors who have this attitude."

"We have antiquated faculty—backward thinking—bitter resentment. They use intimidation to command respect."

"Courses were made more difficult by the lack of quality instruction. Labs are often unbearably disorganized; instructors often had no idea what was required."

"Overdependence on PowerPoint; many lectures consist of a handout being read to us."

"Faculty treat us like middle-schoolers instead of professional students. There is too much old school mindset about the way dental education was in the old days and that's how it should be taught now. There is no progressive thinking about how to teach."

"Professors are very good at telling you how crappy/bad anything you do is, but are unwilling to help you learn what to do to prevent/fix the problem."

"The clinical faculty sit in the back room reading magazines until a student goes in to drag them out. Then, when they see a student's work, all they do is belittle the student, telling him/her how terrible their work is."

4) Student Perceptions of the Quality of Evaluations Provided by Faculty

Lack of calibration among faculty related to providing corrective feedback and assigning grades is a widespread source of concern among dental students. The following observations by students in the C-SWOT study capture the nature of student concerns that were expressed by students at all of the twenty schools. This area of student concern was explored in previous articles by the authors,[10,11] and therefore will not be addressed in detail here.

"Weaknesses would be the instructors who provide different points of view about the projects that are being done in the labs. Practicals are graded unfairly based on the personal view of each instructor."

"Weaknesses in dental school have been that the opinions of lab instructors that grade in lab have caused great frustration. When you are assigned a lab instructor and you do your work based on what he/she wants and then someone else fails you for doing exactly what you were asked to do. This causes extreme frustration and therefore gave me the attitude that, if I practiced, it didn't matter because whoever graded it probably wouldn't like it anyway."

Frequently Expressed Opportunities to Enhance the Curriculum

Students responded to this question: what were the *opportunities for improvement* that would most dramatically enhance the quality of the dental education experience for you and for future students? Students reported that the opportunity for more clinic time early in the curriculum would be the most beneficial enhancement to their education. Students also reported a desire for more patient interaction opportunities to help reinforce classroom learning and more community outreach opportunities throughout the four years of dental school. The third most prevalent theme centered on using new equipment and learning techniques. Many students commented that if they had opportunities to use the most advanced equipment while learning state-of-the-art technique, their educational experience would be more valuable. Following are the prevalent themes expressed in their responses.

1) More Opportunities for Clinic Time Early in the Curriculum

"An untapped resource is the clinic time that is available. It is truly a shame that we're not brought into the clinics at an early time (i.e., second year) and that more time isn't focused or directed to clinics in the upper years."

"Improve opportunities for clinical experience for first- and second-year students (such as requiring twenty assists or more per academic year)."

"Many students have yet to have a one-on-one experience with a patient after a year and a half of dental school. Simple clinical procedures, such as administering local anesthesia, will help the student dentist become more comfortable with actual clinical procedures. Because there is so much anxiety associated with this, it would help students better understand how their patient may feel."

"Need more opportunities for clinic time; halfway through the second year, we are familiar with only three instruments: mirror, probe, and explorer."

2) More Community-Based Service and Educational Programs

"Schedule more experiences at satellite clinics/high schools and allow first- and second-year students to do comp exams, prophys, sealants, and basic operative."

"Provide more outreach programs to the local schools. We could be doing [screening and prevention services] at more schools and really helping out the community where there is a high caries rate."

"Have mentoring programs within the community (i.e., 'shadowing' a dentist once per week as the medical students do with family practice doctors)."

3) Learning New Technology/Techniques

"I think the school should place an emphasis on newer and more modern techniques and applications,

such as implants, veneers, 3/4 crowns, etc. . . . We are taught a good basis of material, but when we graduate, we could end up being old-fashioned in regards to techniques."

"3-D dental anatomy software on computer would really enhance my knowledge of how teeth should be and occlude. More Internet sites with videos and procedure demonstrations."

Frequently Expressed Threats to Dental Education

Students answered this question: what are the threats to the quality of dental education that need to be addressed so dental school (and dentistry as a career option) remains attractive to college students making decisions about professional careers? The students had numerous views on the potential threats to the quality of dental education. The overriding concern expressed by students at all twenty schools was the cost of dental education. Because of the high cost of dental education, students believed their only option was to go into private practice. The migration of virtually all dental school graduates to private practice (either directly or after postgraduate training) contributed to the second most commonly listed threat, which was loss of effective faculty to the private sector, the resulting shortage of instructors, and, candidly, concerns about the quality of instructors that schools are able to retain in teaching positions. The third most commonly expressed threat, which was closely intertwined with previous descriptions of clinical inefficiency, related to students' uneasiness with the requirement system that, based on the frequency of student comments, remains the centerpiece of clinical education at most of the schools participating in the C-SWOT study. Students at all twenty dental schools participating in this study expressed concerns about the ethical underpinnings of clinical requirements (i.e., quotas for completion of certain numbers of procedures in the various disciplines of dentistry), questioned the impact of this practice on patient care, and discussed the stress associated with striving to achieve quotas. The dominant themes were as follows:

1) Cost of Dental Education

"Too expensive. Recently graduated students will not be able to volunteer and teach because they have massive loans to repay."

"Cost of tuition and federally subsidized student loans. The price of higher education is prohibitive to some potential students."

"Dentistry should not become a profession for only the rich and elite."

"COST!!! Soon, only rich students will be able to afford this education—a poor representation of the general population."

"The costs have escalated tremendously, so many middle- and lower-class students will be discouraged from having a huge debt. We are losing great candidates based on family wealth (We Can't Afford School)."

"MONEY! We pay so much for our education, but it still seems that they do not have enough money for us. If any articulators, plastic teeth, or instruments are needed, we have to pay out of our pockets."

2) Loss of Faculty and Resulting Inadequate Numbers of Faculty to Provide Needed Supervision

"Faculty shortage is the greatest threat to quality. The faculty consistently indicate that they are not paid enough to make the job worthwhile."

"INCREASE FACULTY. Lack of faculty coverage in clinic decreases number of chairs available for students. Leads to not being able to get requirements done."

"Being able to attract quality faculty is a concern. The smart people know there's not as much money in teaching as in private practice, so it can be very difficult attracting quality full-time faculty."

"There is a shortage of quality faculty who enjoy teaching and have a positive attitude about the school and dentistry."

"A decrease in the number of really good instructors. Many times, the good ones get chased out, and we the students see this."

"Skilled and knowledgeable faculty are becoming rare; there has been a decrease in enthusiastic, qualified instructors."

"Faculty accepting positions without having the desire to teach; too many older faculty and not enough younger faculty."

3) Students' Uneasiness with the Requirement System

"Requirement-based cherry picking dentistry is a major threat. Students are taught to treat the 'big ticket' items or what the student needs, and the patient gets shuffled around and their needs go unaddressed. This is a major threat to the quality of dental education because you are forced to beat the clock and pass patients down and around. It is unfair to the patient and causes the student undue emotional stress."

"I am already viewing my patients not in terms of what they need and want but in terms of what I need to graduate. I would prefer to concentrate on my

patients as people and not as a container of operative points or fixed points."

"A threat is clinical requirements. I have seen too many students push for crowns over other conservative restorations because they want the CPUs (clinical points) to do well."

"Another weakness has been that too much emphasis is placed on the number of procedures completed (i.e., crowns, bridges, amalgams). It encourages an environment where students, hard-pressed to get procedures done, can act unethically and put their own needs (i.e., the requirements) in front of the real needs of the patient. And the worst part of the system is that the faculty encourage this behavior. They over-treatment plan cases so that students can get their requirements completed."

"We start seeing patients just as requirements and aren't really concerned about their well-being. Personally I feel bad because all I care about is needing three more crowns or one more RPD. I find that students start forgetting about comprehensive care and are just going for sheer numbers. For example, if a patient needs two crowns and scaling/root planing, I would rather just dump the SC/RP on someone else and do the crowns first."

"The requirement-driven curriculum adds stress on students. Students are blamed if they don't meet their requirements, and students feel a lack of understanding and help from faculty. Being responsible for booking your own patients and looking for specific patients who have specific requirements are also added stressors. The focus should be on comprehensive care with pools of patients with different needs in order for students to meet requirements."

Additional Findings

There were two additional areas of generalized concern, not specifically related to curriculum, that students described as both opportunities and threats: 1) inadequate advertisement of dentistry as a profession to college students, and 2) concerns about the impact of managed care. Students from many of the C-SWOT schools described the lack of advertisement of dentistry at undergraduate colleges as a barrier to recruiting exceptional students and thus represented a "missed opportunity" for promotion of the profession. Students observed that they had to seek out information about dental school and dental careers on their own and commented that dental schools did not cultivate an active predental environment at their undergraduate campuses. Students who commented on the lack of advertisement of dentistry as a career at their college mentioned medical school was well advertised and heavily promoted as a career option.

Examples of these comments include the following:

"As an undergraduate, I was bombarded by recruiters, fliers, etc. from medical schools. Never once was the dental school represented at preprofessional meetings or beyond."

"Competition with medical field and other professions. Dentistry is still seen as an undesirable profession to those who are unfamiliar with it."

A second generalized concern about dental practice that was frequently expressed by students was worry about the impact of health policies (primarily third party payment) on the desirability of dentistry as a career. Many students wrote commentaries about the potential rise of managed care as an area that could affect dentistry in the future. Students described their perceptions of how health maintenance organizations have placed physicians in the technical position of applying specific formulas for health care. Dental students hope to hold off what they see as a prescriptive type of patient care. This concern is expressed in this comment, which is typical of numerous observations by C-SWOT students: "I believe that the biggest threat to dentistry as a profession is managed care. Third parties have no place in a dentist-patient relationship. Ownership of dental practices must not include 'investors' with hidden agendas. Managed care is destroying medicine; we must protect dentistry."

Student Perceptions of Combined Dental and Medical Curriculum

Seven of the dental schools in the C-SWOT study operated programs (at the time of the study) in which dental students completed all or some aspects of the basic science curriculum with medical students as a combined class. Many of the C-SWOT responses by students at these schools reflected their perceptions of the benefits and limitations of this educational format. In general, the commentaries by sophomore dental students reflected concerns and negative impressions about the combined dental-medical instruction. Sophomore dental students were concerned with the overriding focus on medicine, felt that much of the curriculum was not relevant to dentistry, and indicated that they were sometimes treated as "second-class citizens." In contrast, assessments

by seniors and residents who went through this type of curriculum were more positive, reflecting that the experience added overall value to their readiness to practice dentistry although actual participation in the combined classes was often stressful. In particular, seniors and residents who attended a school with a combined curriculum felt well prepared for the National Board Dental Examination, Part I; reported they did well on this test; stated they were qualified to work with patients with a variety of medical problems; and perceived that they had a broader view of health care than typical dentists. Notably, both sophomores and seniors/residents described differences between the quality of instruction they encountered in basic science courses taught primarily by medical school faculty and their dental-only courses. In general, students reported that the medical courses were better organized and featured better instructional techniques than dental school courses. The following narratives are illustrative of comments by sophomores and seniors/residents at schools with combined dental-medical programs.

Sophomores

"The strength in my dental education was also my weakness. I feel like I am spending a greater portion of time on medical science, not dental science. I hope there will be courses that can act as a bridge between these two aspects of science."

"For the first two years, we spend 90 percent of our time in medicine with very little support from the faculty of dentistry. We learn too much clinical skills, and the focus of our PBLs is completely medical with very little, if any, dental relevance. We are continuously belittled and put down by medical students and tutors who seem to think that dental students have a hard time with the medical curriculum even though our averages are comparable to theirs."

"We don't have enough time to learn dentistry in the curriculum, since we are doing medical school for two years. It seems a bit scary that we will be treating patients next year and have had only five hours of dentistry, max., per week."

"Too much medical school, not enough dental school. Classes are geared toward the pre-Ph.D. and not the pre-D.M.D., i.e., details of research without clinical implications. I know how to grow a dog tooth in a chicken foot, but not what a carious lesion looks like."

"Because of the heavy concentration on medical sciences, there is a less than adequate amount of time dedicated to the dental sciences. I feel I need to spend more time in the preclinical lab as well as practicing certain procedures on each other such as rubber dam placement, impressions, etc. prior to performing them on patients."

"We are often thrown in with the medical students and are expected to take the same exams as them, even though we don't have the same resources available to us. For example, they often have labs and small group sessions that reinforce lecture materials, while we are left to fend for ourselves."

Seniors and Residents

"While we spent the first two years doing minimal dentistry, I am glad we were integrated with the medical class and I feel I learned a great deal. I think it has made me a better health care professional as opposed to an excellent technician."

"This school has a very strong basic medical science curriculum, and as painful as it was to go through for two years, I feel that I am now very grateful that I went through it. I appreciate it more and more as I treat more patients in the clinic—particularly the medically compromised patients."

"Strong biomedical/basic science background. Great preparation for Board examination. Medical knowledge, critical thinking skills. Good medical emergency background."

"We had a very well-rounded education with a vast exposure to the medical sciences thanks to the joint M.D.-D.M.D. program. Very large emphasis on disease control, rather than the surgical approach to treatment."

"Yes, we may have great board scores, but I think more importantly, we leave as very conscientious and aware practitioners, and if we lack some clinical experience compared to other dental schools, it is because we have spent more time understanding how to treat patients (not just teeth)."

Comments on Quality of "Dental-Only Curriculum" at Schools with Combined Dental-Medical Basic Science Instruction

"The medical/dental curriculum was well run, organized with schedules coordinated. The dental-only curriculum was frequently disorganized and showed no coordination of curriculum."

"Especially in the first year, the dentistry component is very poorly organized, poorly taught, very ineffective, and inefficient."

"The dental components of our education are usually very poorly run and poorly organized."

"I particularly noticed that in the dental classes I attend that the professors who teach the class are somewhat disorganized and do not meet the expectations of the dental students."

Discussion

Before summarizing impressions of the findings from this study, notes about the research methodology are warranted to provide a context for interpretation. Of course, when presenting the "results" from a study that employed a qualitative analysis of the subjects' responses, readers will ponder this question: do I trust the investigators' interpretation of the data and their selection of illustrative examples to highlight the key findings? Further, have they interpreted the information provided by subjects in a reasonable manner and identified the important themes? In general, qualitative researchers attempt to incorporate strategies that will reduce the likelihood of misinterpretation. One such strategy is called triangulation, a process by which qualitative researchers use other forms of data (direct observations, personal interviews, focus groups, etc.) to strengthen findings. This project only solicited students' written comments, and due to the scope of the data collection, it was not feasible to explore the results in more depth with personal interviews or other strategies that might have strengthened our understanding of the students' narratives. This lack of triangulation might be viewed as a potential limitation on our ability to interpret the observations provided by the students.

Another possible problem with the data collection is associated with identification of themes. With such a large database of responses provided in a narrative format, it is possible that certain themes/issues were either missed or overemphasized in the analysis. This problem was addressed by having several individuals with qualitative research training review the students' written narratives and collaborate on identification of themes. The large number of students involved, representing twenty different dental schools, and the extensiveness of their responses reduce the odds that the findings are idiosyncratic to a particular school. The fact that certain student perceptions were repeated over and over again at every school in the study also lends some degree of validity to the identification of prevailing themes.

Whether one reads all 2,421 narrative responses by students or the illustrative comments presented here, the key findings involve the following six themes:

- Clinic
- Teaching
- Organization
- Faculty
- Costs
- Requirements

Clinic. Simply stated, dental students cannot wait to get into the clinic and start working on patients. Dental students want as much exposure to patients and as much experience in the clinical setting as feasible and believe there are lost opportunities to provide additional clinical experience, especially in the first half of the dental school curriculum. The single largest area of student concern was "wasted time in the clinic," which hinders the opportunity for chairside clinical learning. The fact that students are eager to learn the craft they have chosen as their profession is certainly a positive attribute, but on the other hand, dental students also tend to view much of the curriculum prior to the clinical phase as a hurdle to be jumped in order to get into the clinic. Review of the C-SWOT indicates that large portions of the curriculum were repeatedly identified by students as being of questionable relevance and most of these courses were in the biomedical, behavioral, and social sciences. It is up to dental faculty members to convey the relevance of the basic sciences through integration as often as possible. Notably, a study commissioned by the *Journal of the American College of Dentists* in the late 1950s that followed a similar protocol as the C-SWOT with 2,500 students found that students of that era also wanted to minimize coursework in the biomedical, behavioral, and social sciences leading to the investigator's conclusion that "dental students want to become 'practitioners' rather than professional practitioners."[13] This seems like a harsh assessment, but the desire of dental students today to condense nonclinical topics even though 75 percent of the curriculum at the typical dental school is already devoted to preclinical and clinical education (more than any other health profession school)[14] ought to be cause for deliberation among dental educators.

Teaching. Students at every school in this study commented on the frequency of dull, tedious classroom teaching that focused on the lowest level of intellectual challenge, factual recall, with "regurgitation-type" testing via multiple choice exams that primarily assessed capacity for memorization. Strategies for helping students learn at levels higher than memorize and purge are well established,[15] but efforts to have students apply biomedical information to problems, via cases, or to employ even rudimentary critical thinking in dental school classrooms appear to be rare based on the commentaries of the students

participating in this study. Issues surrounding teaching have also been addressed by conducting calibration activities designed to help faculty grade students consistently while avoiding biases sometimes associated with inflated or deflated grading.

Organization. Above all else, dental students value organization in the curriculum. In their minds, organization comprises the attributes of clarity, efficiency, communication, and effectiveness. Review of the students' responses indicates that they are willing to see value in almost any subject matter or course topic as long as it is presented in a well-organized, coherent, and efficient manner. Overall, the students' commentaries reflect that many classroom, lab, and clinic experiences are not well organized, and students often feel that their time is being wasted to the detriment of learning. The only observational study of dental school teaching in the classroom, by Behar-Horenstein et al., reported similar findings.[16] The 1950s study of dental student perspectives found that students in that era had virtually identical concerns about disorganized and uninspired teaching in dental school as described in our study. The author of that study, Douglas More, a personnel psychologist, stated, "It was readily apparent in reading through these more than 2,500 questionnaires that there is some poor teaching in dental schools practically everywhere with poor teaching materials and courses taught with very little attempt to relate the subject matter to dental practice itself. Only a few schools that we could determine from our responses seem to be plunging into new, vigorous, and progressive areas, giving attention to sounder teaching methods as well as curriculum integration."[13]

Presumably, based on typical dental student demographics, most of the students who participated in the C-SWOT study belong to the so-called Generation Y (individuals born between 1980 and 1995). In *Educating the Net Generation,* Diana and James Oblinger summarized the educational expectations of the Gen Y learner.[17] According to the Oblingers and sociologists who have studied the academic preferences and learning styles of the individuals in this generational cohort (which comprises the student body of dental school), Gen Y learners value organization, clarity, and efficiency. They expect well-orchestrated and clearly explained training with immediately available resources, meaningful learning experiences, and precisely articulated learning objectives that can be accomplished efficiently with little wasted time. Gen Yers also expect access to educational materials and instructors "any time, any where," which is an extension of the Y generation's perception of educational institutions as a component of the service industry; that is, schools exist to help the students achieve their educational goals and are expected to provide high-quality instructional service for the learner. Given these expectations, it is not surprising that the C-SWOT students focused so intently on curriculum organization and efficiency.

Faculty. Students at virtually every school represented in this study bemoaned the loss of high-quality faculty to the lures of private practice and provide testimonials to the impact of these losses upon the curriculum. Most of these accounts were negative: experienced and effective faculty with enthusiasm for teaching were replaced with individuals who had little or no teaching experience and, in some instances, no apparent interest in working with students. Students described situations in which dentists who came directly from twenty-five to thirty years of private practice and who had never taught in dental schools were placed in charge of major courses the day they started work in the school. Given the fact that dental schools can still attract high-quality students in spite of escalating costs, it is evident that the faculty "brain drain" is a higher immediate priority. A key finding from the C-SWOT study is that the loss of skilled instructors is diminishing the educational product delivered by dental schools in the minds of the students. Given the Gen Y expectation for high-quality educational service, it must be asked if the continuing faculty recruitment and retention problems will ultimately drive down the perceived value of dental education to such an extent that prospective students will look elsewhere for a professional career.

Costs. Students demonstrated a sophisticated understanding of the underlying financial issues facing dental education as it affects their own pocketbooks (or their parents' bank accounts), future indebtedness, implications for career choice, implications for academic quality related to faculty retention, and implications for dental student demographics in the future. However, in spite of student concerns about spiraling costs, applications to dental schools are on the upswing, indicating the overall desirability of a dental career and perception that the money invested in acquiring a dental degree is money well spent over the long term. Gen Yers are highly success-oriented, much like their Boomer parents, and desire a respected, high-paying professional career that can be blended together with a predictable Monday to Friday, 9 to 5 work schedule and a fully developed family life.[18,19] Private practice in dentistry fits well

with Gen Y goals for career, income, and family, which may account for the increasing attractiveness of the profession in spite of increasing financial hardships.

Requirements. Depending on one's point of view, the resurgence of the "requirement system" in dental clinical education is either a return to the wisdom of the past or a backtracking to an outdated practice. Clearly, the time, energy, and strategies that students devote to finding patients who can help fulfill unit requirements are a major part of the dental school experience. Some students are concerned about this approach to clinical education because it adds stress to an already arduous phase of the curriculum and places in doubt their ability to graduate or stand for licensure exams if the proper numbers of points or procedures have not been accumulated. The debate over the appropriateness and the ethical foundations of requirement-driven clinical education has continued for decades. More, in the 1950s, noted, "Students complain bitterly and almost universally about the prevalence of the point system or similar requirements on clinical cases in order to graduate. Some students feel that these have been so severe that they have actually impaired health."[13] With the loss of younger faculty to the more financially lucrative world of private practice, and the replacement of these individuals with older dentists in their fifties and sixties who have concluded their practice careers,[20] it could be predicted that the requirement system will flourish because the senior faculty who remain at dental schools grew up with this system and "you teach the way you were taught." However, dental faculty clearly need to ponder the messages sent to students by this approach in light of the recent cheating episodes directly related to students' ill-advised efforts to beat the system to acquire credits for procedural work.

Conclusion

Because students who participated in this study were asked to respond equally to positive and potentially negative aspects of their educational experience (strengths, weaknesses, opportunities, and threats), it is not feasible to say that more positive or more negative impressions were provided. However, the overall tone of the comments at most of the schools was decidedly positive, and this is an important "take-home" message. "Weaknesses" and "threats" represent areas that dental schools may need to address as priority items in order to enhance the overall academic experience, and therefore we made a decision to focus more on these "action item" components in reporting the results. Thus, more examples of student comments for weaknesses and threats are presented to emphasize student concerns.

Dental students provide feedback on the quality of their dental education every time a course evaluation or professional survey is completed. The C-SWOT study was designed to serve as another mechanism for dental students to share their views on the curriculum and the overall educational environment. Aside from the six areas of concern (clinic, teaching, organization, faculty, costs, and requirements), students identified three areas that had not been described in previous qualitative studies. Dental students expressed an interest in more overt advertising of dentistry as a profession—particularly in undergraduate programs. Because of the lack of proactive student recruitment, dentistry could be missing a large section of the student population because these qualified students are unfamiliar with the profession. Students in the study also identified the growing concern with regard to managed care. Many students have seen first-hand (if their parents were dentists) or have heard from the instructors the effect insurance companies have had on the medical profession, and they hope to avoid these issues in dentistry. Finally, those students enrolled in a dental school that combines medical and dental students in the first two years of their education felt the information received prepared them for the board examination as well as working with patients that have complex medical histories although they reported that the day-to-day experience of attending classes with medical students was sometimes a less than desirable experience.

The third and final component of the Students' Perspective Project, the C-SWOT, identified similar student issues found in the DSLES and the ClinEd IQ. Students desire a well-organized and efficient curriculum with the best possible clinical experience, with instruction that is up-to-date with regard to clinical techniques and technology, and which is provided by faculty who have an interest in the students' welfare. The perceptions of current students about certain weaknesses and threats are notably similar to those identified by dental students fifty years ago.

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