SCHOOL OF DENTISTRY

MASTER'S DEGREE IN DENTISTRY PROGRAM

SELF-STUDY

I. Context

A. Name of unit authorized to offer degrees:
Departments of Endodontics, Oral Biology, Oral Medicine, Orthodontics, Pediatric Dentistry, Periodontics, Restorative Dentistry

B. School or College(s) if applicable:
School of Dentistry

C. Exact title(s) of degrees offered:
Master of Science in Dentistry

D. Brief description of the field and its history at the University of Washington

The School of Dentistry was established in 1945 and soon after launched two specialty clinical training programs (Orthodontics and Operative Dentistry). Since that time, additional programs have been added and Operative Dentistry has been removed. The most recent of these additions was Pediatric Dentistry, which was fully accredited by the American Dental Association in 1997, rounding out the program to include endodontics, oral medicine, oral pathology, orthodontics, pediatric dentistry, periodontics and prosthodontics. These programs exist as corollaries to the School's undergraduate degree completion program in Dental Hygiene, the Master's program in Dental Hygiene, residencies in general practice and oral and maxillofacial surgery, the Master's and PhD program in Oral Biology and postdoctoral programs in Dental Public Health Sciences

The Master of Science in Dentistry program was structured as an academic pathway for the traditional advanced clinical training programs in the dental specialties. Students enroll after having completed an undergraduate degree and a professional degree in dentistry. The curriculum for each specialty focuses on clinical expertise and is evaluated by the American Dental Association Commission for Accreditation (with the exception of Oral Medicine, which is accredited by the American Board of Oral Medicine). The MSD option augments clinical training with research experiences. These are designed to complement the clinical care-based education students receive by involving them in the generation and dissemination as well as the interpretation and application of knowledge relevant to clinical practice.

The degree came into existence nationally as a means to provide academic training to future dental leaders, researchers and, especially, educators in disciplines for which a PhD does not exist. It thus attracts, and must recruit, a diverse student body comprised of competitive candidates for these positions. As the fields of dentistry have grown more complex, the program has evolved to provide students education in conducting research and clinical training in dentistry at an advanced level and of a scope beyond the single specialty for which they receive a certificate.

At the request of the Graduate School, the MSD program was structured as one joint program including all the specialties rather than as separate programs for each specialty. The curriculum as a whole interfaces with the PhD program in Oral Biology, the post-doctoral programs in

Dental Public Health Sciences and the general practice and oral and maxillofacial residency programs as appropriate. In addition, common courses of for MSD students in all specialties have been developed, and individual specialties have created curricula that address the specific needs of each discipline. (*See Appendix F for curriculum descriptions.*) Students have access to a number of multidisciplinary research centers at the School—including the Regional Clinical Dental Research Center, the Comprehensive Oral Health Research Center and the Research Center in Oral Biology—in which to plan, conduct and receive support for their research.

The program is administered by a committee of the specialty graduate program directors and an ex officio graduate program coordinator. Each of the specialty programs is situated within the administrative structure of an academic department within the School of Dentistry, which is administered by the Dean and an elected Faculty Council.

II. Unit roles and responsibilities

A. Units generally have a variety of roles and responsibilities within the institution (e. g. , undergraduate, graduate, professional education; continuing education; research, scholarly, or creative activity; service; consultation; self sustaining activities; patient care). What are the principal roles and responsibilities of your unit within your school/college and the university?

The MSD program and the School of Dentistry are an integral part of the University of Washington Health Sciences Center, and share many educational, research and community service programs with the Schools of Medicine, Nursing, Pharmacy, Public Health and Community Medicine and Social Work.

The School's ten academic departments offer programs leading to the degrees of Bachelor of Science with a major in Dental Hygiene, Doctor of Dental Surgery, Master of Science and Doctor of Philosophy in addition to the MSD program and residencies in oral and maxillofacial surgery and general practice dentistry. Major teaching and patient care programs are located in the UW Health Sciences and Medical Center, University, Harborview and Children's Hospitals, Fred Hutchinson Cancer Research Center, VA Medical Center and Yakima Valley Migrant Farmworker's Clinic. The School also serves as a major provider of continuing dental education programs offered throughout the State and Pacific Northwest region, many of which involve MSD faculty.

The School of Dentistry leads the nation in peer reviewed research funding from the National Institute of Dental and Craniofacial Research and hosts a Regional Dental Clinical Research Center; a Research Center in Oral Biology; Dentist-Scientist and research training grants in periodontology, oral epidemiology and biostatistics; program projects in the etiology and management of chronic pain; epidemiological programs directed to oral diseases among women; and a Summer Research Institute for faculty that draws participants world-wide. The MSD program takes full advantage of these resources by utilizing departmental funds and a training grant for students matched with foundation and alumni funding focused exclusively on providing students research experiences.

The School was recently awarded a Comprehensive Oral Health Research Center, in collaboration with the School of Medicine and Children's Hospital, from the National Institute of Dental and Craniofacial Research. The Center focuses on the child as a key to lifelong oral health, and will involve projects that progress from basic research to provide new insight into origins of disease susceptibility in children; to translation of basic knowledge into new diagnostics, treatments, and preventive populations; to outreach designed to communicate the findings and educate professionals to conduct more research. It is anticipated that MSD students and faculty will have a strong presence in the new Center.

B. What opportunities do these roles provide you and how have you taken advantage of them? What plans do you have for exploring additional opportunities? What opportunities have you missed and why?

The MSD program has benefited from major opportunities in teaching, research and patient care in the oral health disciplines at the University of Washington, receiving funding and resources that would not be available without the larger infrastructure of the School. MSD students have the opportunity to teach in the School of Dentistry, interfacing with the predoctoral DDS program, and in the Center for Human Development and Disability and Children's Hospital, where they mentor residents in Pediatrics and General Practice. In addition, students are encouraged to enroll in the School of Medicine's medical education courses. In research, the MSD program has had the advantage of involvement with both basic and clinical investigations associated with the Regional Dental Clinical Research Center, the Research Center in Oral Biology, the fellowship research training program for predoctoral students and the newly funded Comprehensive Oral Health Research Center. In the area of patient care, the diverse and highly integrated clinical programs in endodontics, oral and maxillofacial surgery, oral medicine, orthodontics, pediatric dentistry, periodontics, prosthodontics and general dentistry provide a regional diagnostic and treatment resource. As a result, the clinics are able to attract and serve children and older adult patients whose access to dental care would be otherwise limited by physical, mental or economic disadvantages.

The MSD program has utilized the considerable resources present at the School to integrate the rapidly changing human biological and biosocial knowledge base, significant shifts in demography of oral disease, technological advancements for restoration of the dentition and innovative approaches to prevention and treatment of craniofacial disorders. New initiatives in pediatric dentistry and maxillofacial surgery have been incorporated, and all disciplines comprising the MSD program have seen major changes associated with dental implants, new pharmacological therapies, digital radiology, microsurgery and knowledge of the human genome.

The involvement of faculty and graduates with the Continuing Dental Education program at the School has given the program a leadership role in the region, augmented by the service of faculty in professional organizations.

The School as a whole continues to invest resources in the development of resources for attracting research and other funding and expanding patient care opportunities. The MSD

program is working towards a greater utilization of resources within the School of Medicine for basic sciences and research methods education.

The program was forced, unfortunately, to discontinue its teaching assistantship program after it was determined that its time constraints and limited resources were problematic when implemented in the MSD curriculum. Other opportunities for funding and training students have been called upon to meet the mission of the previous teaching assistantships. Also, the program has found it to be problematic for students to pursue a PhD and specialty clinical training under the federally funded Dentist Scientist Award. Clinical training is time consuming and difficult to integrate with an extensive didactic curricula. The School has pursued other means for funding potential PhD students who are recruited from the specialty programs.

C. What differences do you observe between your view of your role and the college/university expectations of your unit? How might these differences be resolved?

The mission of the MSD program is consistent with the mission of the School of Dentistry in that the program prepares students to be proficient oral health professionals, contributes through research to the understanding of basic biological processes as well as behavioral, biomedical and clinical aspects of oral health and serves the regional community. However, the MSD program does differ from many other University master's degree programs because it is integrated with advanced clinical training and provides a framework for research experience that is specifically relevant to the provision of advanced clinical care. The program has worked to balance the needs of an academic research experience and a clinical training program, most specifically in terms of allocation of funding and time. The program has found consistent support from the School and Health Sciences administration in this task.

D. What changes have occurred in your field over the past decade that have influenced your conception of the unit's role? What pressures, internal and external, have caused significant changes, and what further pressures and changes do you anticipate in the next ten years? What changes have taken place in the relationships between your field and other related fields?

Three major factors have effected change in dental education, in general, and the MSD program, in particular. The first factor involves substantial shifts in the patterns of oral disease and changes in demography of the US population, as well as the backgrounds of students entering the dental profession. The second is a comprehensive study of dental education by the Institute of Medicine. The third is a biological and technological revolution in approaches to oral health care.

A remarkable improvement has occurred in the nation's dental health, with substantial decreases in the prevalence of caries and the periodontal diseases, and dramatic increases in retention of the dentition. Results of a recent NHANES III dental survey found no caries in the permanent teeth of 55 % of children and adolescents aged 5 to 17. Moreover, about 80% of the caries present occurred in less than 25% of the 5 to 17-year-olds. The survey also showed that one-third of U.S. adults retain all of their teeth and only 10 % of adults are edentulous. Ninety percent of

adults surveyed had, on average, a natural dentition comprised of 24 teeth. This represents a major shift in the demography of oral disease and patient care needs. Three decades ago, a majority of patients had lost all of their teeth and were wearing full dentures before the age of fifty. Two decades ago, patients were also beset with extensive tooth loss, were functioning with combinations of fixed and removable restorations and were fighting a slowly progressive battle with generalized periodontal disease. One decade ago, patients retained the majority of teeth with complex and increasingly fixed restorations, and some areas of localized periodontal attachment loss. In this decade, the majority of children are essentially caries free and can expect to retain their dentition for a lifetime. Concurrently, new challenges in oral health have accrued from retention of the dentition for an increasingly longer lifetime and severe oral disease is increasingly localized to high risk population groups, many of whom have diminished access to oral care because of financial, cultural or geographic disadvantages.

At the same time, demographic estimates also suggest that there have been major changes in the patients who will require dental care in the coming years. Present projections show that the U.S. population will increase by more than 60%, reaching 400 million by 2050. Moreover, the growth will be concentrated at the two ends of the age spectrum. The birthrate is expected to increase dramatically in the new century and will augment young arrivals through immigration. By 2011, the oldest members of the Baby Boom generation will reach 65 and by 2050, the number of citizens 65 years and older will have doubled. Concurrently, our population will become far more diverse, and the term "minority" will need to be redefined.

The diversity and educational demands of students entering the dental profession also have changed markedly. The number of applicants to dental predoctoral and graduate programs, including the MSD program, is increasing. Such an increase in applicants reflects a national shortage of general and specialist dentists projected for the first decade of the new century. In addition, women and minorities as a percent of enrollment have increased from 2.1% and 12.9% in 1970 to 35% and 33% in this year's predoctoral and graduate national classes.

The Institute of Medicine (IOM) recently completed a long awaited report entitled, *Dental Education at the Crossroads: Challenges and Change.* While the report recognizes many strengths in dental education, it warns that these strengths are overshadowed by curricula and patient care activities that are out of touch with the needs of current dental practice by insufficient attention to research and scholarship, by relatively high educational costs compared to other units on the campus and by uncompetitive patient care programs. The Institute worried that under such conditions, dental education would lack allies to sustain it in a future world of diminishing resources. To meet these challenges, the report lists 22 specific recommendations that revolve around five major themes. *First*, it predicts that dental practitioners will require more medical knowledge in the future and will need to work more closely with other health professionals as new approaches to health care delivery evolve. *Second*, the report recommends that dental education must teach desirable models of clinical practice with greater extension into the community in order to provide students with a greater volume and breadth of clinical experience. This recommendation also includes a plea for a year of postdoctoral education with an emphasis on general dentistry and the admonition that dental school clinics must be more patient-friendly and efficient. *Third*, the report warns that successful dental schools will need to

demonstrate their value to their parent universities, health centers, and communities and can no longer afford to be isolated centers of excellence in technical dentistry. *Fourth*, the report encourages continued reforms in accreditation and licensure to minimize the deficiencies in the present system while involving all major parties in the process of change. *Fifth*, the report promotes experimentation by dental schools with different models of education and practice in order to be ready for an uncertain future.

Faculty at the University of Washington served in an advisory capacity to the Institute of Medicine and played a major role in the recommendations given in the report. The faculty see these rapidly shifting forces as an opportunity to maintain a well documented national excellence in oral health care, expand the educational options to meet student demand and interest, increase the biological and behavioral background of our graduates and explore new educational approaches to clinical training. At the same time, we are exploring ways to recognize, and build our curricula on, the diversity of our national patient population, the oral diseases for which they seek care and the students who have chosen to care for them. Finally, we are examining how managed care will affect our educational programs, particularly the pressures in academic health care settings and the services that patients will demand in an ever increasingly competitive health care marketplace, as well as collaborating with the local professional community in providing access to care for the physically, economically, and culturally disadvantaged.

E. What criteria are typical in your field against which you measure the success of your unit as a whole?

MSD programs across the country are judged on their ability to attract competitive applicants, recruit and retain quality faculty, graduate highly skilled clinicians, researchers and academic dentists, provide excellent care for a pool of appropriate patients, and receive research funding for student and faculty projects, training and investigations.

F. In what ways is your unit a leader in your field? Describe areas and strategies for developing your potential for leadership in your field.

The MSD program maintains an average applicant to accepted ratio of approximately 30:1. Faculty involved with the program are outstanding as researchers, clinicians and leaders in the professional community (*See Appendix I for faculty curricula vitae.*). Graduates of the program are recruited for positions as clinicians (80%), in academic programs (33%) and in research (10%) (*See Appendix E for data on placements*). The clinical component of the MSD program is comprised of 20,000 patient visits per year. In addition, students have a publication rate of 60%, with an equal percentage presenting their research at professional meetings. Once graduated, these students overwhelmingly continue to participate in professional organizations (96%), lecture to groups (69%) and teach (61%). (*See Appendix H for survey data.*)

The program provides care at the rate of 20,000 patient visits per year—acting as a viable referral site for low income and special needs patients in the region. The School has ranked first in the country in federal research funding for several years, and it continues to attract major grants for research centers. When announcing the recent award of the Comprehensive Oral Health

Research Center, Dr. Harold Slavkin, director of the National Institute of Dental and Craniofacial Research, noted "[These awards] indicate that the applicant group and the research they proposed is at a level of excellence unparalleled in the field."

The School has addressed the national shortage of dental faculty and researchers by innovative recruitment packages, combining the resources of its clinical, educational and research programs. In order to remain a leader in the field, it will need to continue to develop means for recruiting and retaining faculty, as well as utilizing its current resources to expand future opportunities for faculty and students.

G. **In what ways do you collaborate with units at other institutions to maximize the effectiveness of each institution's contributions to the field? How do your ties to similar departments at other institutions across the country help you to respond to new developments in your field? How could/should these ties be strengthened?**

See H below.

H. **In what ways have you collaborated with related areas on this campus? What would be needed for ties with these related units to be strengthened?**

The School of Dentistry is an integral part of the University of Washington Health Sciences Center, which includes the Schools of Dentistry, Medicine, Nursing, Pharmacy, Public Health and Community Medicine, and Social Work. Research collaboration with the Health Sciences Center schools is particularly strong and has a major influence on research experiences of MSD students. Examples include the strong presence of the Schools of Medicine and Public Health in the Comprehensive Oral Health Research Center, active collaboration with the Departments of Biochemistry and Microbiology in the Research Center in Oral Biology, and extensive co-investigator relationships with the Schools of Medicine and Pharmacy in the Clinical Research Center. In addition, MSD students interface with the Summer Institute for Clinical Research, sponsored by the Department of Dental Public Health Sciences.

In addition, the School operates major general dentistry and specialty clinics within the Health Sciences Center complex and has affiliated educational, patient care, and research affiliations with University Hospital, Harborview Medical Center, Children's Hospital and Medical Center, the Fred Hutchinson Cancer Research Center, Veteran's Administration Medical Center, the Kaiser and Group Health Cooperative Hospitals, Yakima Valley Farmworkers Clinic and a wide range of public health and institutional care facilities in the State of Washington.

Regional and national affiliations are located in professional organizations rather than formal cooperation with other educational programs. Each dental specialty has a designated national academy, which is responsible for organizing research meetings, creating competency assessments and awarding board certification. Faculty in the MSD program are intimately involved in these academies as well as regional and national groups dedicated to the field of dentistry in general, including research organizations like the International and American Association for Dental Research. Students are encouraged to participate in these groups during and after their enrollment in the program.

III. Degree programs

A. Bachelor's degrees

Not applicable.

B. Master's degrees

1. **If applicable, show the relationship of Master's degree programs to the undergraduate and/or doctoral degree programs in your unit. Describe the objectives of your Master's degree program(s) in terms of student learning and other relevant outcomes, as well as its benefits for the academic unit, the university and the region. In the case of a terminal Master's degree, compare your objectives with those for programs at institutions you think of as peers.**

The advanced specialty education program is comprised of students (post DDS/DMD) in the postdoctoral clinical specialty programs of endodontics, oral medicine, oral pathology, orthodontics, pediatric dentistry, periodontics and prosthodontics. The primary objective of the clinical specialty programs is to develop clinical expertise in the specific discipline, including all theoretical principles, practical knowledge and skills in the appropriate area. In the course of this mission, students participate in clinical care designed to meet the specialty needs of the community and region. The MSD program is the structured framework for a complementary didactic program and the mechanism for providing a research experience to these postdoctoral students.

The primary objectives of the MSD program are:

1. To prepare students to be proficient oral health professionals in the advanced clinical specialties of endodontics, oral medicine, oral pathology, orthodontics, pediatric dentistry, periodontics and prosthodontics at a level consistent with national and regional trends for the profession.
2. To provide a formal research experience. This formal experience would enable expertise in developing a research protocol, establishing a research budget, providing a research experience, evaluating research data, creating conclusions based on that data and providing the opportunity for that individual to make an original contribution to science.
3. To provide the graduate student an in depth didactic program beyond the already extensive experience they have had as college and dental students in order to give them the knowledge required to interpret and apply current practice, innovations and research findings in their chosen field.
4. To prepare individuals for careers in teaching and/or research at the university level and/or other professional organizations settings so that they will utilize their skills as future leaders of dentistry and of their communities.
5. To prepare individuals for the challenge of life long learning and professional development, including service to the community and the profession.
6. To provide high quality dental care in the specialty areas for the public.

7. To contribute to the predoctoral, research and general patient care programs within the dental school, the university and regional allied programs at the community colleges (dental assisting and hygiene programs).

These objectives are typical of MSD programs nationally, which vary in emphasis, quality and scope of the research experience. It is the program's mission to provide a high quality research experience in conjunction with didactic curriculum, of a level adequate for training of a junior researcher and/or faculty candidate, to students who choose to pursue this option as a supplement to advanced clinical training.

2. **List the standards by which you measure your success in achieving your objectives for Master's program(s). Using these standards, assess the degree to which you have met your objectives and discuss the probable causes for your success. Indicate the factors that have impeded your ability to meet your objectives and your plans for overcoming these impediments. What additional steps do you envision to improve the overall quality of Master's degree programs?**

The MSD program uses the following standards to measure its success in meeting objectives:

Student Learning and Preparation for Career

1. The number of applicants selected into the specialty programs who elect and complete the Master's program.

- Overall, 90% of students who enrolled in the advanced specialty education programs over the last 10 years pursued the MSD in addition to clinical training. This is attributable in part to the fact that a research background is considered in the admissions process, and partly to the level of support and range of opportunities for research available at the School.

2. The number of candidates who successfully defend their theses in an open forum.

- Overall, more than 80% of students defended their theses in an open forum in the last 10 years, pointing to active student committees and a general commitment to student research at the School.

3. The number of graduates who have established careers in the fields of dental care, education or research.

- 100% of graduates have placements within these fields, signifying the relevance and quality of students' preparation. *See Appendix E for data on placements.*

4. The number and willingness of research faculty to sponsor graduate students who are in a clinical specialty program.

- In the last 10 years, 172 students have completed the MSD program. They have received faculty sponsorship from a pool of about 70 faculty members, who benefit from having the highest level of research support of any dental school in the country.

5. The number of research experiences that lead to publication in a peer reviewed journal, poster session and/or oral presentation at a professional meeting.

- The percentage of students whose research is published or presented is approximately 60% for the last 10 years, and the submission rate is approximately 75%, attesting to the quality of the research experience, faculty mentoring and student effort in the program.

6. Awards won by graduate students within and outside the university for their work
- The percentage of students who receive such awards is approximately 15%.

7. The number of graduates who teach or have taught at some level in dental education.
- According to a recent survey, more than 60% of graduates have taught in formal education programs for DDS, graduate, dental hygiene or dental assisting, with more than 30% of the graduates of the last 3 years holding at least part time academic appointments. This shows that the program's commitment to education is communicated well to students.

8. The number of graduates who continue active service to the community and profession by joining local, state, regional and national dental organizations.
- Nearly all graduates surveyed (96%) were members of professional organizations. Faculty mentoring can be credited for instilling a commitment to service in our students.

9. The number of graduates who take a leadership role by serving on committees within these professional organizations.
- More than half (56%) of graduates serve on committees, and almost 40% have been officers of a professional organization. These numbers suggest that our graduates are respected by their colleagues as clinicians and leaders, which reflects on the program's dedication to these principles. These percentages are expected to increase the longer graduates are involved in professional organizations.

10. Financial and other support that these alumni continue to provide our programs.
- Two specialty programs' alumni have pledged to raise enough funds to endow a faculty position each. One alumnus has established an endowment of $100,000 for graduate stipend support. Strong alumni support for student research has been given to funds established in each department This level of support indicates that alumni regard the program as a worthy philanthropic investment. In addition, a number of alumni have held or now hold clinical faculty appointments with little or no compensation to support the clinical teaching program.

11. Direct feedback about the quality of the program from graduates of the program through exit and follow-up questionnaires.
- A summary of the data collected from a recent alumni survey is included in Appendix H.

Patient Care

11. The number of patients per year served in its Health Sciences, University, Harborview, VA and Children's hospital sites.
- 20,000 patient visits are managed by MSD students per year. The graduate clinics provide a necessary corollary to the general patient care clinics, providing specialty care and consultation where appropriate.

Support for Institution

12. The teaching contribution to predoctoral and graduate programs.

- MSD students assist in the predoctoral clinical endodontics, fixed prosthodontics, orthodontics, pediatric dentistry and periodontics programs. In addition, pediatric dentistry students mentor general practice and pediatrics residents at the Center for Human Development and Disability and Children's Hospital.

13. The amount of funding received for research projects and training grants.

- Specific funding dollars spent for MSD projects and grants has not been tracked, but nearly 80% of students in the last ten years have received some funding support for their research, either from internal or external sources. The School's excellent mentor faculty and resources for research are a large part of the success of grant applications by students.

In response to a need for more comprehensive education, a number of our specialty programs have increased the length of their programs and thus their tuition without offsetting stipend support, yet the quality and quantity of applicants has remained steady (on average it is nearly 30:1). The School also established a new specialty program in Pediatric Dentistry, which attracts competitive applicants and was awarded full accreditation by the ADA in its first review.

Several factors have been addressed to insure the meeting of these objectives. *First*, since 1995 there has been a turn over in directors of three of the larger clinical specialty programs and the establishment of one new specialty program. This has required newly hired or appointed faculty to take on the significant burden of learning the logistics for administration of the programs. The current directors are faculty with strong backgrounds in teaching, specialty care and research. The Graduate Program Directors Committee has been an effective force for problem solving and strategic planning for the joint program. *Second*, providing student financial support continues to be a challenge. A one time grant of $50,000 from the Washington Dental Service Foundation was discontinued when the foundation revised its mission. The School has earmarked recent funding from the National Institutes of Health to offset this funding loss from WDSF. In addition, faculty members have generously donated money for student research funding each year as part of the Microsoft Challenge. *Third*, a capital request for extensive renovation of some of the specialty clinics has been repeatedly rejected by the Legislature (although it has been supported by the University). The faculty of the School have supported a much reduced plan to use reserve monies to renovate the most needy of these facilities. *Fourth*, a national shortage of academic and research faculty candidates continues to make faculty recruitment and retention difficult. The School has committed to extraordinary efforts to attract and provide support for prospective faculty candidates.

The MSD program directors have designated the following items as priorities for the improvement of the program:

1. Increased stipend support for students. With continuing cost increases for education and the high debt of most dentists, many qualified dentists may elect to enter private practice rather than continue postdoctoral education. Providing support in conjunction with a highly relevant, quality educational program is the best means for attracting competitive students to graduate work.

2. Junior faculty mentoring. A number of junior faculty are poised to become sponsors and mentors for MSD students after they have completed the requirements for promotion and, eventually, tenure.
3. Curriculum management. The program will continue to review courses to improve content and revise time slots to improve utilization of faculty and other resources while keeping the course load at a reasonable level for maximum student learning.
4. Patient care improvements. The program will continue to improve the delivery of care by reviewing policies, evaluating resources and facilities and proposing changes where beneficial.

C. Doctoral program(s) (if applicable)
Not applicable.

IV. Responses to change

A. How have teaching and learning for both undergraduate and graduate programs changed in your unit in the last 10 years? What further changes do you anticipate or would you like to instigate?

A steady increase in applicants to the predoctoral and specialty programs has been seen in the last 10 years, as data have made clear that the field will have expanding opportunities for clinicians entering the profession. In addition, women and minorities make up a larger part of the applicant and student body, resulting in much needed enrichment of the dental curriculum to address issues specific to these populations. Washington has joined the Western Regional Board, replacing its unique certification process for practitioners. As a result, the number of clinicians eligible to practice in the state, as well as applicants who desire to be trained here, has risen.

A major change in the predoctoral dental school teaching program in recent years revolves around a new preclinical simulation clinic. In it, students learn technical procedures in an environment that as closely as possible resembles a clinic, reducing the artificiality of many of the laboratory exercises used to teach psychomotor skills. Each unit is equipped with dental equipment identical to that used in the predoctoral dental clinics. The clinic is also outfitted as a multimedia teaching facility, with the capability to transmit live audio and video and the potential for interactive electronic instruction. The simulation laboratory has markedly increased the effectiveness of preparing students for managing the needs of dental patients. This facility and others like it will affect the clinical skill level of future graduate school applicants.

Over the last 10 years, evidence-based teaching and learning have gradually replaced the empiricism of the past. Research has established a scientific basis for many, if not most, of our treatment procedures. A shift toward clinically-related research has augmented research into basic phenomena. As a result, there has been a shift away from the empirical toward a more evidence-based approach to teaching and learning in both the predoctoral and graduate programs. At the same time, patient care has become more complex medically and technically, with pharmacological, biomedical and therapeutic advances from many fields being integrated into

standard dental practice at the general, and especially the specialty, level. The program has evolved to meet the advancements.

B. **In what ways have new developments in the following areas influenced teaching in your unit?**
   - **interdisciplinary studies**
   - **distance learning**
   - **experiential learning**
   - **international study**
   - **educational technology**

In the last 10 years, research and clinical training has necessarily become more interdisciplinary, owing to the complex nature of the oral diseases now commonly treated. In response to this trend, the MSD program has developed interdisciplinary courses and implemented cross-teaching where clinical education in a specialty requires it. Research experiences have been definitively interdisciplinary—requiring students to be trained in the methods of clinical and basic research in addition to their clinical training. Students in the MSD program are enrolled in the Summer Institute for Clinical Research sponsored by the Regional Clinical Dental Research Center and the Department of Dental Public Health Sciences in order to access its excellent opportunities for education in biostatistics, epidemiology and other topics relevant to clinical research.

Dental school education has always heavily relied on experiential learning. Mastery of technical procedures and the gaining of live patient experience requires a commitment to a one-on-one educational experience at both the predoctoral and graduate levels. In deference to this, the program has implemented modular and web-based courses for some didactic material. These nontraditional formats make it possible to offer students the opportunity to access information at a level tailored to their individual needs without imposing significant time or facility restraints. It is expected that more and more material will be transferred to this media to increase the efficiency of student learning.

C. **In what ways have new developments in the following areas influenced research, scholarly or creative activity in your unit?**
   - **revolutionary advances in the discipline**
   - **changing paradigms in the discipline**
   - **changing funding patterns in your field**
   - **new technologies**

The discipline of dentistry has undergone vast changes over the past several years that have changed the way we diagnose and treat oral disease. These changes are due to our increased knowledge base and understanding of the epidemiology, specific bacterial etiologies and immunoinflammatory mediators of oral disease. With the ability to look at the pathogenesis of oral and craniofacial disorders at a molecular and genetic level, our treatment will focus more on prevention of disease rather than its treatment. The future of biomimetics will be utilized to better replace lost teeth and the surrounding structures with an engineered equivalent restorative that is biologically accepted and functions with similar properties as the missing tissue.

The field of dental materials is also changing at a rapid rate. Materials for tooth and tissue replacement are constantly being developed and marketed and is demonstrative of the technological advances in the field of dental biomaterials. Because of the competitive nature of marketing dental materials, they often are utilized before they can fully be tested. There is a great need for proper research into the efficacy of these products.

Because of the new direction that dentistry has taken, research will be needed to develop new technologies and to test the effectiveness in treating diseases of the cranio-oro-facial complex. The MSD program already utilizes the highly successful Summer Institute on Clinical Dental Research to train its students and faculty in study design and methods, epidemiology and research technology. In addition, project funding has become available from numerous sources inside the university as well as out. Internal funding is available through many sources, including training funds through the dentist/scientist program, the Regional Clinical Dental Research Center, the School's graduate/faculty research fund and the newly-funding the National Institutes of Health Comprehensive Oral Health Research Center. Outside funding may be obtained through the National Institutes of Health and National Institute of Dental and Craniofacial Research grants as well as corporate sponsorship.

The simulation clinic developed for the preclinical program opens the door to developments in simulation and multimedia for the graduate programs, continuing education and faculty development. As such, it augments the considerable resources of the research centers and facilities already available to faculty and students in the MSD program.

By what means does your unit measure its performance in research, scholarly or creative activities? In terms of those measures, how successful is your unit?

The MSD degree program measures its performance in the areas of research and scholarly activities in a variety of ways. The most significant of these is whether or not students publish their results in a peer-reviewed journal or an approved thesis format. Additionally, the program monitors its success by whether or not students provide oral or poster presentations at national meetings. Some departments require a thesis instead of a published paper, others require both. The theses are evaluated carefully by both the Graduate Program Review Committee and the department's graduate review committee. Many students present their results at local meetings, study clubs and research day presentations.

The Graduate Program Review Committee has monitored the quality of research by graduate students over the last seven to ten years. Initially, this Committee met on a regular basis to review student's research findings, and found that the quality of graduate research was very high, a fact reinforced by the student rate of publication and presentation (about 60%). The Committee concluded that an annual review of student theses and papers was no longer required. Instead, the Committee and the program faculty periodically review the status of graduate students' research to insure that the high standards are being maintained. All departments have a research committee that monitors each student's book project, and most departments have a research seminar where students present their research at various stages from initial concept through

presentation of findings. The seminar format assures that faculty and graduate students from within the departments as well as those from other disciplines have an opportunity to have input.

Students often request and receive funding for their research. The process of securing funding offers another opportunity for monitoring and guiding the quality of their research efforts. Within the School, the Research Advisory Committee is one body that funds projects. The RAC, made up of seminar researchers from several departments, selects projects for funding that are well conceptualized and carefully designed. In addition, students compete for departmental funding earmarked for competitive graduate student projects.

The Washington Dental Service Foundation has funded a number of graduate research studies. Both the School faculty and Washington Dental Service monitor the quality of the research students have proposed and completed. Students collaborate with faculty on federally-funded grant projects on a regular basis. The funding for these investigations is a competitive process, so that only those projects with the greatest merit are funded. Students necessarily must perform at a high level to successfully gain, and keep, research support.

In terms of how successful the MSD program has been in research and scholarly activities, the following statements can be made:

- 92 projects were identified between 1992 and 1998. Of these, 65 have been published in peer-reviewed journals with the remaining portion being designated and submitted as a thesis without publication. (As previously noted, not all departments require a journal manuscript as the end product of the students' projects.)
- Of these 92, 36 students presented their results at national meetings, and a number of these projects were funding by research awards. This ratio suggests that our students compete nationally at a very satisfactory level.

D. **What changes have you observed and do you anticipate in the next 5 years as your unit responds to the need to provide service to:**
    - **The University of Washington**
    - **Your discipline or profession**
    - **The broader community**

At the University level, the program is committed to the widely-recognized need for collaborative research and conjoint teaching within the health sciences and related basic science fields. The School of Dentistry has collaborated and will continue to collaborate with the School of Medicine, the Departments of Epidemiology, Psychology, Molecular Biology and other basic sciences areas in their research efforts. Additionally, there are conjoint courses in medicine, psychology and other fields in which our students enroll and our faculty contribute. All health sciences areas as well as the School of Dentistry benefit directly from collaborative research in terms of education of undergraduate students who observe this process as well as the results of research being incorporated into the core undergraduate dental program. Over the next 5 years, the program directors expect the course integration and collaborative research to occur even more frequently, especially as units participate in investigation under the umbrella of the new Center.

The changes that the program has observed and anticipates in relation to the dental profession include increased amounts of behavior sciences provided within both the undergraduate and graduate training programs. The MSD program is well positioned to take advantage of, and contribute to, this trend by accessing the School's behavioral sciences research programs, the largest of any dental school in the country. More complex computer technology is expected to be utilized in the teaching and research components of the MSD program as innovations are approved for use in the clinical practice of dentistry and as instructional technology becomes available. Additionally, already increasing molecular biology and basic sciences content in the curriculum is anticipated to result in students having a broader perspective of health care as well as more sophisticated abilities to provide care to the public. The profession as a whole will benefit from our students presenting their findings to national meetings, local study clubs, continuing dental education courses, etc. External health care providers will continue to have the opportunity to refer patients for complex specialty care and consultations through the graduate programs.

Changes affecting the community include the continued availability of complex patient care for a group of patients who may not otherwise have access to care due to financial or geographical limitations. Highlighted among these are phobic, geriatric, mentally and/or physically disabled and immune-compromised patients who have special needs in terms of dental care. Those patients who participate in and receive care in these specialized dental programs are educated to become better consumers of health care as a result.

By what means does your unit measure its performance in service activities? In terms of those measures, how successful is your unit?

The MSD program measures its service activities in part by the number of lectures that are provided by both faculty and graduate students to the University at large, the professional community and the public. Our graduate students and faculty teach not only in the School of Dentistry but also in interdisciplinary courses and allied health care programs. Students and faculty present their research directly to practitioners in local study clubs. Of the approximately 100 graduates responding to a recent survey, 70% report that they have given lectures to professional organizations, while 61% have taught in a professional school. Additionally, 76% have provided presentations to local study clubs, 56% are members of committees for professional organizations and 37% have been or are officers within organizations. A full third of graduates from the last three years have taken positions in academia, while another 10% are researchers. These impressive numbers indicate that the program's service mission is well communicated to students and is supported by the didactic and research focus of the curriculum.

E. **What strategies has your unit developed to address the following anticipated changes in the next ten years?**
   - **faculty retirements**
   - **increasing numbers of undergraduate students (majors and non-majors)**
   - **increasing demand for Master's or doctoral programs that will accommodate the needs of full-time working professionals**

- **increased need for doctoral training that will prepare faculty for the full spectrum of higher education institutions**
- **increased need for doctoral training that will meet the requirements of industry**
- **emerging technologies for research and teaching**
- **pressures on space**
- **pressures on budgets**
- **the demand for accountability**

Identify the ways (other than budget increases) the college and/or the university could facilitate your progress in these areas.

The School of Dentistry is administered jointly by the Dean and by its Faculty Council, the six members of which are elected by the faculty to: 1) consider academic policies, priorities, resource allocations and budgets; 2) recommend members for the Standing Committees on Admissions, Curriculum, Student Progress, Student Affairs, and Research; 3) nominate members of the Appointments, Promotion and Tenure (APT) Committee for subsequent election by the faculty; and 4) prepare annual assessments of educational and research areas needing coordinated attention and long range planning. The elected Faculty Council reviews both undergraduate and graduate academic policy continuously during monthly meetings and engages in long-term planning for these programs at quarterly meetings of the entire faculty. Major issues in the 1999-2001 faculty strategic plan include faculty retirements and recruitment, budget allocations, space renovation, new curriculum development, relationships with the community and incorporation of the new Centers for Clinical Research and Children's Health into the education and research roles of the School.

One of the critical points of discussion at the recent international dental schools and dental research meeting in Vancouver was the absence of new teachers and investigators entering dental academics. It was generally agreed that faculty recruitment, faculty development and faculty retention should receive major attention. The School has an international reputation for educational and research excellence and has been able, thus far, to attract outstanding new faculty. A rigorous appointment process, clear guidelines by the APT Committee for evaluation, promotion, and tenure, a fertile University and health sciences research environment, department based faculty development programs, and an National Institute of Dental and Craniofacial Research supported Summer Faculty Research Institute combine to assure the quality of the faculty.

Over the years, the MSD program has responded to the need for preparing future dental faculty and researchers by expanding its scope, which now includes Pediatric Dentistry, and by modifying its program length to increase the breadth of education offered. The program will continue to consider expansions and modifications according to national trends in the disciplines.

The School operates on an annual budget of about $24 million dollars, of which 37% is allocated by the University, 38% from research grants and contracts primarily from the National Institutes of Health (8%) and National Institute of Dental and Craniofacial Research (30%), 17% from patient care, and 8% from continuing dental education, gifts and endowments. Budget requests are formulated by all programs and forwarded to the Dean for discussion with an Advisory

Committee comprised of Department Chairs, Associate Deans, Directors, and the Chair of Faculty Council. The School has met reductions in University support primarily by shifting costs to substantially increased levels of clinical income, research funding, and other sources, and will continue to do so.

In the early 1990s, the School of Dentistry contracted with SLR, Inc., Health Care Consultants and Architects (SLR), to facilitate the planning process and provide needed technical support for making critical long term functional and space decisions. Functional requirements of each department were established through in-depth interviews with each departmental chairperson and division director. This information was used to describe existing activities and functions that occur throughout the School of Dentistry, together with an assessment of future growth trends and anticipated changes in curriculum, patient care, research and faculty. Projections of the types of persons who carry out those activities and functions were calculated based on the existing set of users, and adjusted to reflect anticipated changes. Space users include a range of faculty types, student categories, support and technical staff and patients. Decisions about the amount of space to be allocated for each type of user or function were made based on current space allocation criteria used by the School of Dentistry and the Health Sciences Center, actual space now used by the School (if adequate to meet current needs) and new space allocation criteria addressing functions omitted from current standards. Capital costs were based on a cost estimating methodology developed specifically for this plan, taking into consideration the physical conditions of existing buildings and their ability to accommodate the desired types of activities.

The SLR Report recommended a space plan based on three overriding criteria: 1) correct existing functional and physical deficiencies that adversely affect teaching and related patient care as early as possible; 2) minimize capital expenditure through renovation of existing facilities rather than plan for new building construction; and 3) provide sufficient space to accommodate current and new programs within the present space of the School of Dentistry. The School has followed the SLR Plan, within funding limits, to complete renovation of the teaching clinics, establish a simulation teaching laboratory, improve computer infrastructure and renovate research laboratory space in Oral Biology, Periodontics, Orthodontics, and Oral Medicine. Future space renovation for 2000-2002 includes new research space to accommodate the Comprehensive Oral Health Research Center, renovation of the graduate teaching clinics and office space for new faculty.

The MSD is uniquely accountable because its graduates must meet the standards set by the State in order to practice and the membership criteria of professional and honor organizations. The School maintains strong relationships with organized dentistry and the professional community, and the percentage of MSD graduates who are practicing professionally (82% in the last 3 years) and who are members of organizations (96%) indicate the success of the program in this arena. In addition, the percentage of graduates who are offered academic appointments (30% in the last 3 years) speaks to the caliber of the training of our graduates. (*See Appendix E for data on placements.*) A highly supportive Alumni Association is represented on many of the School's committees and has been the major source of funding for student scholarships, fellowships and matching capital for construction.

F. **Demographic changes**

How is your unit responding to changing U. S. demographic trends? What specific steps have you taken to make your student body, staff and faculty more inclusive by incorporating members of underrepresented groups? What additional steps have been planned? What specific steps have you taken to ensure that members from underrepresented groups are included in the life of the department in ways that benefit their professional development and success?

The effect on dental education and research, both at undergraduate and graduate levels, associated with demographic changes in the U.S. population, oral disease patterns and students, has been discussed in Section II D. The School of Dentistry exceeds national averages for women and underrepresented groups included in undergraduate, graduate and faculty populations. The School values and seeks diversity in its students, staff, faculty and patient populations, and will continue to do so. All junior faculty are aggressively mentored and provided with opportunities for development in their roles as integral contributors to the departments' overall operations and administration. The spheres of research, patient care and education are fluid within departments, and most faculty maintain activity in all areas simultaneously. This insures a diverse peer group and an interdisciplinary group of colleagues for faculty of all ranks.

G. Personal productivity

1. What steps has your unit taken to encourage and preserve productivity (in research, teaching and service) on the part of all segments of your faculty?

There are several avenues available for enhancement of faculty productivity:

- Release time for participation in intramural and extramural practices allows faculty the opportunity to supplement their income, keep up contacts in the professional community and maintain clinical skills levels.
- Funding for small research projects and pilot studies is available internally and is aggressively courted by the School. Equipment grants and other enhancements are also pursued. Faculty are encouraged to collaborate on large project grants.
- Peer Teaching Evaluation Review Committees have been established as a means for teaching faculty to receive feedback from their colleagues in the discipline about their instructional techniques and skills.
- Regional Clinical Dental Research Center and the new Comprehensive Oral Health Research Center, as well as the Research Center for Oral Biology provide funding, facilities and expertise to faculty who wish to purse clinical and basic research projects.
- Grant support for career enhancement and development of junior and senior researchers is aggressively pursued by the School.
- Pay raises based on merit have been instituted as allowed by the Legislature. In addition, competing offers have been made to retain faculty. Recruiting efforts are engineered with the administration in order to make special arrangements and packages possible.
- Support to attend professional and scientific meetings is given in terms of travel funding and release time.

- Photographic and graphical support for faculty research, presentation and teaching projects is available from the Office of Information Services and the research centers.
- A Multimedia Laboratory was established with previous Faculty Workstation Initiative funding—this laboratory is a shared facility housing equipment that would be prohibitively expensive for individual departments to purchase. It is open to faculty, staff and students.
- The Continuing Dental Education program is the largest in the region and it encourages involvement from faculty and students.

How are junior faculty members mentored to enhance their professional development?

Department chairs meet with junior faculty at least annually to discuss their development and contributions to the department, according to guidelines established by the University. Junior faculty are encouraged to collaborate in research projects, take on teaching assignments and participate in the clinical activities of each department as a means for professional development.

The School's Appointment, Promotion and Tenure Committee meets to review faculty portfolios, according to detailed guidelines which are published and distributed to all faculty upon hiring. The School has established a unique "clinician teacher" pathway to promotion which gives teaching faculty the opportunity to develop their careers with a focus on educational and clinical aspects of the School's mission, rather than pursue the research-intensive tenure track. This has made it possible to recruit and retain faculty who might otherwise not have been attracted to academic dentistry.

What impediments to faculty productivity exist, and what plans do you have for overcoming them?

The multiple missions of the departments in the MSD program—education, patient care, service and research—impose burdens on all faculty members. Teaching loads (including clinical supervision), especially, weighs heavily on faculty time and effort. The program is continuously seeking means for streamlining activities and pooling resources to reduce the effort required from individual faculty members. The Dean has been particularly supportive of initiatives to utilize research funds, recaptured salary and other monies to release faculty from excessive teaching loads. The clinician-teacher pathway is an example of an institutional response to the problem of teaching load and faculty development.

2. **What steps has your unit taken to encourage and preserve productivity on the part of all segments of your staff?**

School wide programs for training and certification of clinical staff are well established for areas critical to the operations of the clinics. As the largest employer of dental assistants in the state, the administration has paid close attention to the concerns of clinical staff and successfully worked with them to improve the efficiency of clinical activities, including facilities renovation, equipment repair and purchases and scheduling. Technical support for computer activities is available through the Office of Information Services. An outstanding maintenance staff is available to troubleshoot and repair equipment.

How are staff recognized and rewarded for their performance?

There is a School-wide Staff Recognition Committee which has as its mission the exploration of means for recognition and reward of staff and the improvement of morale. Staff are released from duties to attend its functions and encouraged to participate in its programs.

What programs are in place to support professional development of staff?

Staff for whom clinical training is relevant are encouraged to attend continuing education courses offered at the School or through the professional organizations in the region. In addition, the University's resources for career advancement and training are made available to all staff. Technical support for complex computer activities is made available to staff through the Office of Information Services.

V. Goals

A. What is the process by which the unit sets its overall goals? How often are departmental goals reviewed and reassessed? In what ways do you anticipate the goals of your program will change in the next ten years?

The planning process for School of Dentistry strategic goals is well established and continuously ongoing, given the rapid scientific, technological, clinical and economic marketplace changes in the discipline. The process involves departments; the School's Faculty Council—consisting of six elected individuals empowered by the faculty to formulate and review academic policy, engage in long-term planning and nominate candidates for appointment to the standing committees and for election to the Appointments, Promotion and Tenure Committee; an internal Dean's Advisory Committee comprised of department chairs, associate deans, directors and the chair of Faculty Council; and external advisory groups made up of alumni, officers of the Washington State Dental Association and representatives from the professional and corporate dental community.

The Faculty Council of the School of Dentistry is the primary focus for planning. The Council is charged with preparing critical assessments of areas needing future, coordinated attention for purposes of long range planning. Such self-evaluation and outcomes measurement are part of a continuing process that uses assessment devices including admissions, curriculum, personnel and student databases, student and peer teaching evaluations, formal surveys of alumni, patients, faculty and both entering and graduating students, research rankings, and student performance on state, regional, and national board examinations. The Council oversees the process of preparing for accreditation and other institutional evaluations, as well as School and University departmental and program reviews.

The relatively small faculty size allows the School of Dentistry to have all final plans discussed and approved by all faculty within their departments in addition to formal discussions and votes by faculty of the School as a body.

Planning for the MSD program is the responsibility of the Graduate Program Directors Committee, which is comprised of the Dean, Associate Dean for Academic and Clinical Services (and Graduate Program Coordinator) and the 9 program directors in dental public health sciences, endodontics, oral biology, oral medicine, oral surgery, orthodontics, pediatric dentistry, periodontics, and restorative dentistry. This group meets regularly to discuss and reach consensus on goals and objectives for the program, necessary modifications and the exploration of new opportunities and resources. Initiatives that impact the School in general are forwarded to the Faculty Council for discussion and approval. The Graduate Program Directors Committee continuously re-evaluates its goals according to the results of outcomes measures and pressures for change. The Committee formally evaluates each of the programs every 7 years as part of the American Dental Association's accrediting process (with the exception of Oral Medicine).

B. **List your goals for the next 5-7 years. How should you be rewarded by the college and/or the university (specify alternatives in addition to increased budgets) for achieving these goals? In what specific ways could the college and/or university assist you in achieving your goals?**

As noted in Section IV B2, the MSD program directors have designated the following items as short term goals of the program:

1. Increased stipend support for students. With continuing cost increases for education and the high debt of most dentists, many qualified dentists may elect to enter private practice rather than continue postdoctoral education. Providing support in conjunction with a highly relevant, quality educational program is the best means for attracting competitive students to graduate work.
2. Junior faculty mentoring. A number of junior faculty are poised to become sponsors and mentors for MSD students after they have completed the requirements for promotion and, eventually, tenure.
3. Curriculum management. The program will continue to review courses to improve content and revise time slots to improve utilization of faculty and other resources while keeping the course load at a reasonable level for maximum student learning.
4. Patient care improvements. The program will continue to improve the delivery of care by reviewing policies, evaluating resources and facilities and proposing changes where beneficial.

The individual specialty programs and the School as a whole will undergo an accreditation site visit within this timeframe, insuring that competencies and standards set by the ADA will be addressed as needed.

The University and School have consistently provided support when feasible for these goals. With increasing budget pressures, support is less readily available than in the past, especially for faculty salaries. The Graduate Program Directors Committee will continue to work with the Faculty Council, department chairs and the Dean to resolve impediments to attaining these goals. Faculty development support currently offered by the University will be a key factor in future strategies.