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A SURVEY OF THE ATTITUDES AND PROFESSIONAL ACTIVITIES OF DENTAL GRADUATES FROM THE UNIVERSITIES OF BRITISH COLUMBIA AND WASHINGTON PRESENTLY ENGAGED IN GENERAL DENTAL PRACTICE

by

ROBERT MERL LITTLE

a dissertation submitted in partial fulfillment

of the requirements for the degree of

DOCTOR OF PHILOSOPHY

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Approved by Henry L. Reitan
(Chairman of Supervisory Committee)

Department Education
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UNIVERSITY OF WASHINGTON

Date: July 10, 1974

We have carefully read the dissertation entitled "A Survey of the Attitudes and Professional Activities of Dental Graduates from the Universities of British Columbia and Washington Presently Engaged in General Dental Practice" submitted by Robert Merl Little in partial fulfillment of the requirements of the degree of Doctor of Philosophy and recommend its acceptance. In support of this recommendation we present the following joint statement of evaluation to be filed with the dissertation.

The study analyzed opinions and attitudes of general practitioners regarding dental education with particular emphasis on orthodontic training with a view toward suggested curriculum revision.

Graduates of two dental schools, the University of British Columbia and the University of Washington, formed the two groups for the study. Of 432 Washington graduates surveyed, 332 responded and of the 105 British Columbia graduates, 86 responded to a mailed questionnaire. In the second phase of the study, 35 of the respondents were randonly selected for personal interviews. Qualitative content analysis was employed in analyzing these data.

Among the findings were the fact that British Columbia graduates, who spent significantly more time in orthodontic training, recognized a greater need for orthodontic care than Washington dentists. They were also more ready to refer patients to specialists than their Washington counterparts. Washington graduates were more inclined toward instituting treatment with less emphasis on comprehensive diagnosis of abnormalities. Both groups felt that orthodontics should be taught as a major portion of the dental curriculum.

Based on the finding, recommendations were made regarding predoctoral orthodontic education and long-range curriculum planning.

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Finally, the investigator dedicates this dissertation to Bucky, his son, the joy and reason for everything.

CHAPTER 1

INTRODUCTION

A 1970 report of the Carnegie Commission on Higher Education stated, "The most serious shortages of professional personnel in any major occupation group in the United States are in the health services."[1] The United States has been able to produce a competent and highly trained health professional but has been capable of meeting the health needs of only a fraction of the populace. The international ranking of life expectancy in the United States as compared with 22 industrialized nations was nineteenth for males and sixth for females in 1967 while the ranking of infant mortality rate was fifteenth.[2] Although life expectancy has very slowly improved and infant mortality has been reduced, the United States world ranking has actually deteriorated, the infant mortality rank, for example, has slipped from eleventh in 1960 to fifteenth in 1967.[3] Health and health care are of increasing concern and the delivery of health services is an issue high on the list of priorities for study, evaluation and improvement.

Dental Health Care Crisis

The ability to cope with dental disease has been discouraging. The U. S. Public Health Service reported that from 1960 to 1962 about 20 percent of those aged 45 to 54 in this country had lost all their teeth and the percentage increased sharply with age.[4] Green stated in 1972 that 95 percent of the population were attacked by dental caries while 60 percent of young adults, 80 percent of middle age adults, and 90 percent of those over 65 had serious periodontal problems. The orthodontic needs have been equally serious with 60 percent of the children suffering from serious

orthodontic problems and 20 percent with severe orthodontic conditions. He concluded, "In terms of sheer bulk, the existing backlog of unmet dental needs in the U. S. adds up to the biggest and costliest problem we face in the whole field of health."[5] As stated by the American Dental Association Task Force on National Health Programs, "The backlog of dental neglect and untreated dental needs of the nation is huge. The paradox is that we are a nation with many dental cripples while at the same time we are superior in dental science and technology, and have the most advanced dental organization in the world."[6] The 1970 estimate of 100,000 practicing dentists for a population of 205 million people represented a ratio of dentists to patients which was worse than in 1940, and it was estimated in 1971 that a mere 40 percent of the population were then seeking care.[7]

Health care has increasingly come to be regarded not as a necessity but as a right to which all are entitled. The United States has become richer, better educated, and more inclined and able to seek personal services. Present trends in 1974 point to greater health care for children, the aged, poor and disabled. Federal, state, local and private financing of health care has added increasingly to the pressure for treatment. Dental research and technology has and will continue to shift the emphasis in treatment from alleviation of pain, extraction, and the construction of restorations for carious and missing teeth to a greater concern for prevention and orthodontics. Modern communication and public awareness may result in greater public recognition and demand for dental therapy.

The predicted manpower deficit, according to the American Dental Association Task Force, is approximately 7,000 dentists by 1980 and 16,500

by 1990, an optimistic estimate which would merely meet the 1970 rate of demand for service. Recognizing the difficulties of such predictions they stated, "Estimating the need for dental manpower in the future is complicated by multiple unknown factors--uncertainties about base-line demands for dental care, about basic supply of manpower presently projected, about changes in productivity of the dental work-force, about benefits and coverage by national dental health programs and others."[8] The Task Force recommended continued expansion of the number of dental graduates through greater federal support for construction and operation, greater enrollment, a shortened curriculum, and greater use of auxiliaries. The Carnegie Commission Report of 1970 no doubt influenced American Dental Association (A.D.A.) direction by their recommendation of a 20 percent increase in graduates while the estimate of the American Association of Dental Schools (A.A.D.S.) was even higher.[9]

The federal government, recognizing the present and future dental needs of society and following published guidelines, became increasingly involved in the direction of curriculum design. Logically to politicians, more graduates meant better care; therefore, to gain more graduates the federal authorities proposed shortening the dental curriculum by one year and enticed the schools to follow this pattern by offering additional funds based on the number trained and graduated in the shorter curriculum. Trustees and deans, always pressured by a lack of funds, have viewed such "gifts" as irresistible. However, the solution to the problem of manpower does not seem to lie merely in greater federal support or graduating more of the same type of dentists. As a published scenerio states:

> There is no convincing evidence that mass construction of dental schools or mass production of dentists, despite

> the shortage of both, is the answer. The solution will more likely depend on educating the future dentist with new methods of functioning, on the training of new types of auxiliaries to assume responsibility for many of the routine procedures now performed by the dentist, on an altered pattern of dental practice that will increase the efficiency of the delivery of dental health care, and on incentives to influence the selection of practice sites in geographic regions of greatest need.
>
> The type of dentist that will be required to meet the needs of the future will be one with a broad overview of dental knowledge, with astute diagnostic acumen, with tact and judgment in dealing with people, with superior clinical competency in specific areas, with managerial and executive abilities necessary for directing an expanded practice, and with altered attitudes toward his own role and the potential of others in health care delivery.[10]

Dental Curricula

Dental curriculum planners have been embroiled in the perplexing controversies of What should be taught to whom? What should be the characteristics of the graduate dentist? What type, how long, and how flexible a curriculum should be planned? What will be the role of dentist, specialist and auxiliary in the future? What type of dental health care delivery system would be more suitable to the needs of our society?

Although the questions are many, there has been general agreement on the first priority of treatment. As the A.D.A. Task Force and the A.D.A. House of Delegates have concurred, "Comprehensive dental services for children should have the highest dental priority...."[11] These groups encouraged the profession to actively pursue the treatment of malocclusion with emphasis on interceptive treatment and early care for disfiguring and handicapping malocclusion. Public education, fluoridation, and preventive dentistry resulted in a greatly reduced incidence of dental caries. Dental research and improved therapeutic techniques changed the emphasis from

restorative dentistry for children to a greater concern for prevention and orthodontics.[12] Although the need and demand for orthodontics is evident and accepted, the role of generalist and specialist in the delivery of this service has been controversial ever since the founding of orthodontics as a specialty area of dentistry at the turn of the twentieth century. One extreme view has been that the general dentist should be capable of recognizing the developing orthodontic problem and then should immediately refer the patient to the specialist for treatment. Another more liberal view has been that the generalist's comprehension of orthodontics should be much more sophisticated in recognition, diagnosis, treatment planning and definitive treatment. Dental curricula reflected these divergent opinions with the result being considerable controversy and lack of uniformity between schools, departments and graduate dentists.

To design a curriculum which will be appropriate for the dental health care system of the future, planners must have a clear understanding of the nature of curricula, its elements, sources, models of design and planning as well as the methods of assessing its effectiveness. The traditional view of curriculum has been that of a document or master plan listing courses, time, and outcomes. However, during the 1960's and 1970's educational theorists broadened that concept as illustrated by the following definitions of curriculum:

> ...a sequence of potential experiences designed to modify thinking and behavior.[13]
>
> ...all the learnings, skills, habits and attitudes that individuals make part of themselves and which then influence their activities.[14]
>
> ...a structured series of planned learning outcomes representing an output of a planning system and an input of an instructional system.[15]
>
> ...a series of content units....[16]

> ...a system composed of development, implementation, maintenance and change.[17]
>
> ...the vehicle for the unfolding of alternatives.[18]
>
> ...the total content, environment and experience of the institution organized to produce learning.[19]

According to Hilda Taba all curricula, no matter what their particular design, are composed of certain elements. She continued:

> A curriculum usually contains a statement of aims and of specific objectives; it indicates some selection and organization of content; it either implies or manifests certain patterns of learning and teaching, whether because the objectives demand them or because the content organization requires them. Finally, it includes a program of evaluation of outcomes. Curricula differ according to the emphasis given to each of these elements, according to the manner in which these elements are related to each other, and according to the basis on which the decisions regarding each are made.[20]

To paraphrase, curriculum includes all phases of the educational scheme from curriculum development including the who, what, when and why of curriculum decision making, the models of curriculum development and the input into the instructional system where these schemes are implemented. Curriculum designers must be involved with more than planning and implementing; they must be concerned with the evaluation process, that is, evaluation of student performance which is first a measure of curricular structure, second a measure of instruction, and third a measure of student ability. Evaluation must be concerned with the particular curricular items selected including the relevance and appropriateness of these topics as ingredients of the curricular framework. The planner must attend to measurement of the affective realm of objectives as well as the transferability of what is taught to what is needed and what is retained. Curriculum design is more than a myopic view of the school as a disseminator of knowledge, and the curriculum a list of courses. A curriculum involves the overall function

of the institution as a dynamic changing organism composed of planning, implementation and evaluation with a clear goal reflecting the needs and desires of society.

Accountability is inherent in current curricular development at all levels of education--accountability to the student, the patient, the profession and our society. Accountability ultimately demands justification of any educational program, justification based on an accurate interpretation of the sources of curriculum. Ralph Tyler proposed that the sources of curriculum are the needs and interests of the learners, the values and needs of society, and the disciplines or subject matter specialists.[21] Bellack has broadened the sources to include "...those elements of the content of the culture which are considered appropriate or relevant to the instructional aims of the school."[22] Johnson agreed with this latter view when he stated, "...the source of curriculum, the only possible source, is the total available culture."[23] Commissions, task forces, committees, the public media and individuals have exclaimed the critical needs of our nation in regard to dental health care. Dental educators have proposed and implemented curricula which have inadequately met the practice needs of the graduate and the care needs of the patient. Seldom has the practicing professional been actively brought into curriculum development and planning, his experience sought and advice heeded. Finally, the characteristics of the learner, the nature of learning theory, the concepts of educational delivery, and the needs and aspirations of the student are too often superficially considered in the curricular decision making process.

Statement of the Problem

The University of Washington School of Dentistry is undergoing a constant critical self analysis and redefinition of long range goals. To assess the

educational needs of the dental student appropriate for the perceived role of the generalist in the future, it would seem appropriate to consider the general dentist, an often neglected source of curricular input, analyze his practice needs and competence, determine and understand his attitudes concerning dental school education, perceive his aspirations for the future and compare these qualities and characteristics with his formal dental school education. Child care, the A.D.A.'s foremost priority, should be studied in depth analyzing the generalist's attitude toward the general practitioner's and specialist's role in preventive, restorative, and orthodontic intervention.

Purpose of the Study

It was the intent of this dissertation to provide data, conclusions and recommendations in regard to curricular content which would be of value to the School of Dentistry in formulating a curriculum suitable to meet the needs of dental practice with emphasis on the education of dental professionals in the orthodontic care of the non-adult.

Research Questions

1. What is the degree of discrepancy between the perceived role of the general dental practitioner regarding orthodontics and his ability to fulfill this role?
2. What, in the views of general practitioners, are the areas of strength and weakness in dental school education?
3. What effect does the amount of orthodontic curriculum content have on:
    a. the subsequent effectiveness of the dental graduate in recognizing orthodontic problems and instituting appropriate timely treatment or referral?

b. the attitude of general practitioners toward their dental school orthodontic training?

c. the attitude of general practitioners toward their orthodontic colleagues?

Hypotheses

1. As indicated by their own evaluation, general practitioners who have been trained by means of a dental school curriculum in balance with the patient care needs of general practice, as opposed to those practitioners who were not trained in such a curriculum,
   a. are more effective in their role performance in the delivery of dental health care,
   b. have a more positive attitude toward aspects of dental school education which contain adequate content,
   c. are actively pursuing practice goals in harmony with the dental needs of our society.
2. As indicated by their own evaluation, general practitioners who have been trained in a more comprehensive dental school orthodontic curriculum, as opposed to those graduates of schools not utilizing a comprehensive orthodontic undergraduate curriculum,
   a. are more effective in the recognition, diagnosis, and institution of treatment or referral of orthodontic problems,
   b. have a more positive attitude toward their orthodontic education,
   c. maintain a more cooperative attitude toward the orthodontic profession and orthodontic specialists.

Definition of Terms

Terms used in this study are defined as follows:

1. Community Dentistry: That area of dentistry concerned with the method of furnishing dental health care to all members of society.

2. Cooperative Attitude: A harmonious relationship between general practitioner and specialist to jointly produce desirable dental health care.

3. Crown and Bridge: That area of dental practice which deals with replacement of missing teeth by means of artificial fixed units or individual coverage of single tooth units.

4. Dental Auxiliary: A trained dental technician, under the direction and supervision of a dentist, competent to perform functions either directly on the patient or in conjunction with another dental professional.

5. Dental Needs of Society: The subjective and objective evidence of necessary dental care.

6. Dentist: A graduate of an accredited (by the American Dental Association or Canadian Dental Association) North American dental school.

7. Dentistry: That branch of health care that deals with the care of the teeth and the immediate contiguous dento-facial structures.

8. Diagnosis: That area of dental practice concerned with the recognition and identification of abnormal conditions.

9. Effectiveness: The professional production of intended or expected advantageous results.

10. Endodontics: The area of dental practice dealing with removal of diseased tissue from within and immediately adjacent to the root of a tooth.

11. General Practitioner (Generalist): A graduate dentist engaged in the spectrum of oral health care with primary emphasis on preventive and treatment procedures of the oral hard and soft tissues.

12. Operative Dentistry: The branch of dental practice concerned with restoration of individual tooth units.

13. Oral Surgery: The branch of dental practice involved with surgical management of oral disease.

14. Orthodontics: That area of dentistry concerned with the growth, guidance, correction and maintenance of the dento-facial complex, with special emphasis on developmental disturbances and those conditions that cause or require movement of teeth.

15. Orthodontist: A graduate dentist who through advanced study and certification by an institution accredited for graduate and post-graduate orthodontic education, limits or restricts his field of professional practice to the specialty of orthodontics.

16. Pedodontics: That area of dentistry which is limited to the treatment of children, specifically to provide a program of complete oral health during this developmental period.

17. Pedodontist: A graduate dentist who through advanced study and certification by an institution accredited for graduate and post-graduate pedodontic education, limits or restricts his field of professional practice to the specialty of child care.

18. Periodontics: That area of dentistry which deals with correction of disease states involving the supporting structures of the teeth.

19. Positive Attitude: A strongly favorable position, disposition or manner with regard to a person or thing.

20. Preventive Dentistry: The portion of dental practice devoted to anticipation and prevention of abnormality or disease.

21. Role Performance: The proper execution of a dental skill or ability.

Assumptions

The following assumptions were made regarding the study:

It was assumed that British Columbia and Washington dentists had similar predental educational backgrounds, were products of a similar range and representation of sociological environment, and practiced within a similar professional and ethical value system.

It was assumed that general practitioners of British Columbia and Washington face similar oral health care problems with a similar population of patients demonstrating a comparable incidence of disease and abnormal developmental conditions.

It was assumed that individuals responding to the survey were representative of Pacific Northwest recent dental graduates and that those individuals selected to be interviewed in depth were representative of graduates practicing in urban areas.

Delimitations

The survey was limited to an examination of dental graduates of the immediate past six years from the University of Washington and the University of British Columbia who have been engaged in general dental practice.

Application of the personal interview was limited to selected individuals of the above mentioned group who have been practicing in either Seattle, Washington, or Vancouver, British Columbia, and the immediate suburbs of these cities.

Summary

Changing needs and demands for dental health care and changing emphasis toward particular types of care require a continuous reassessment of dental educational programs. An examination of one source of curriculum input, the opinions and experiences of the general dental practitioner, should assist curriculum planners in designing more effective dental education programs which will be in harmony with the patient needs of the future and the care delivery capability of the practitioner.

CHAPTER II

EVOLUTION OF MODERN DENTAL EDUCATION

Dental Curricula

The history of any biomedical science involves a gradual passage from craft to profession as its members change from a role of technician and mechanic to one of clinician and investigator. The modern dental graduate utilizes a scientific background and clinical technique hardly recognized by his predecessor of the last generation; but the last generation thought the same about its predecessors. In the biomedical sciences knowledge is ever changing and never complete. The breakthrough of today is often obsolete or proven false tomorrow. By evolution and revolution dentistry developed into a profession from a craft, not through security and stagnation in the knowledge of a particular time, but through thought, investigation, application and change.

Dentistry in the United States developed from the preceptorial, or tutorial, system for the training of various trades and professions--common practice in the Middle Ages. The quality of apprenticeship training varied with the expertise and patience of the dentist and generally emphasized mechanical rather than scientific skills. Not until the mid-nineteenth century did dental health care begin to evolve from craft to profession by the establishment of a formal dental school program, the first being the Baltimore College of Dental Surgery in March of 1840.[24]

Early in the history of dental institutions, educators sought to establish standards of acceptance, training, and competency of practice to quell the rapid multiplication of proprietary schools and incompetent

graduates. However, formal independent authoritative bodies were not accepted until the turn of the century as discussed by Horner,

> National accrediting agencies are a comparatively recent development in the history of American education. Dental schools were conducted in the United States for seventy years before any concerted effort was exerted beyond what the schools did themselves to standardize their work. In this period, faculty organizations representing groups of schools made some moves in this direction through requirements for membership, but no group made formal announcement of lists of approved schools in the sense in which accrediting bodies operate in many fields of higher and professional education today.[25]

Established in 1909, the Dental Educational Council of America, which later became the Council on Dental Education of the A.D.A., was the first extramural agency in this country instituted to appraise and to improve dental education and to classify and accredit dental schools.[26, 27] The Council, composed of representatives of the A.D.A., National Association of Dental Examiners and the A.A.D.S. (predecessor organizations representing dental practitioners, dental examiners and faculty) sought the "advancement of dental education and the unifying of the standards of the various national bodies of the dental profession."[28]

Although early in its existence the Council listed specific courses and hours necessary for a school to meet minimal requirements for so-called "Class A" or fully accredited status,[29] by 1940 the Council indicated the subjects of study it would expect to find in the curriculum of a dental school seeking approval while it avoided the specification of the number of clock hours to be given to each subject.[30] In addition, the Council prescribed a "...four-year dental course of not less than 3800 clock hours and not more than 4400 clock hours...and (the Council) announces that it will not be disposed to consider for approval a school which goes outside these limits in either direction."[31]

These recommendations, still in force today with little modification, evolved from a number of surveys and countless meetings and debates. From a course composed of a few lectures over several months followed by a preceptorship program, as was common in the mid-nineteenth century,[32] the programs gradually became founded on science and applied research,[33, 34] until in 1916 the Council recommended that a full four-year course of eight months in each year be required,[35] although an alternative of two years of predental education and four years of preceptorship was acceptable.[36] A grant from the Carnegie Corporation in 1930 made possible an extensive study by the A.A.D.S. culminating in a report of its Curriculum Survey Committee.[37] The study involved an assessment of oral health needs, the determination of specific dental courses, the ordering of the courses in a curriculum, and outlined requirements for admission to the dental schools. This study resulted in acceptance of a minimum pre-dental requirement of two years followed by a four year dental education, standards which are still in effect. The Council on Dental Education found that by 1941 the 1934 recommendations of the Curriculum Survey Committee had been followed in large part but the percentage of time to be devoted to the various subjects had only begun to be debated.[38-41]

Recent curricular recommendations of the Council on Dental Education state:

> In its evaluation of a dental education program the Council will consider the stated objectives of the school, what it seeks to accomplish for the student, the profession and the public, and how well it succeeds in realising these objectives. Inasmuch as no curriculum has enduring value, the program of each dental school will be judged finally not by its conformity to type nor by predetermined measurements, but rather in terms of the achievement of its own stated aims and objectives which should lead to a graduate qualified to

> practice dentistry. Although the Council recognizes that the dental curriculum is customarily of four years duration, it should provide for recognition of the individual differences of students and changing trends in higher education by making it possible for outstanding students to meet the standards for graduation in less than four years. Some students may, of course, require a longer period of time.
>
> The curriculum should be flexible and should be based on appreciation of dentistry as a health service. It should provide for introspection and research and should afford opportunities for adjusting to advances in knowledge. The relative time assigned to the subjects in the dental curriculum should be determined by their respective contributions to the aims of the dental education program. The curriculum should be conceived of as a unit and in terms of the interdependence and balance of its related parts. Correlation of the various courses is essential to an effective educational program as well as to optimal student achievement."[42]

Dental education became more flexible in admissions, curriculum, and goals with few constraints placed on the dental schools. Consequently, curriculum committees, faculty and general practitioners became increasingly embroiled in the perplexing problem of determining the appropriate distribution of individual student learning activities among the academic and clinical disciplines.

Orthodontic Curricula

In 1904 at the Third Annual Meeting of the American Society of Orthodontists, Dr. G. V. Black, unquestioned leader of modern dentistry, and Dr. E. H. Angle, founder of the specialty of orthodontics, discussed the divergent views of orthodontic education which remain the primary conflicts today.[43] In reply to a question posed in a speech before the group by N. S. Hoff, "How much orthodontia should we attempt to teach students in dental colleges?", Angle replied,

> In my opinion orthodontia never will be taught successfully in dental schools. ...there is a certain percentage of dental students who, if placed under the correct environment, would make useful and competent

> orthodontists, but it is wrong to try to force every student to become an orthodontist.

G. V. Black, dean, scientist and educator of substantial influence and status retorted.

> Every school must teach orthodontia, and to the whole class. I do not mean to say that we can make ideal orthodontists of each member of the class, because that is not expected. ...there will be a great number of these young men who will do the more simple things in orthodontia, ...and do them well. In the more severe cases he will send for a specialist and not attempt to do them himself; and yet he will be a useful man in his neighborhood.

Angle spent 14 years, from 1885 to 1899, in four dental schools attempting to develop comprehensive teaching programs in orthodontics. He failed to interest dental school faculties and students in his endeavors, "...giving up his university affiliation more in disgust than despair."[44] Brodie stated, "He never had much respect for dental schools or for dental education after that, and the final labors of his life, extending through some 25 years, were devoted to efforts aimed at the complete divorce of orthodontia from dentistry."[45] By 1921 an opposing furor was developing within the Universities. Johnson reported for the Educational Committee of the American Society of Orthodontics, "The science of orthodontia treats the growth, development and functional activities of the dental apparatus and so constitutes an essential element in the undergraduate curriculum."[46] Angle opposed this view vigorously, ceasing his teaching career in 1925 to direct all of his energies toward separating orthodontics from dentistry.

While the formation of graduate departments of orthodontics during the 1930's may have been an acceptable compromise to Angle's followers, the demands for undergraduate instruction continued. In 1932 suggestions for increasing the quality and quantity of teachers of orthodontics were made.[47] A summary statement followed the Curriculum Survey Committee

meeting of the A.A.D.S. in 1935:

> General dental practitioners in the future should assume the responsibility to render orthodontic service and consequently the dental schools should prepare them to meet this obligation. This service should include advisory and preventive service and the correction of the simpler cases of malocclusion.[48]

The inclusion of treatment procedures in undergraduate education was a debated question prior to the 1935 report and has persisted since.[49] Noyes stated, "...no rules for distinguishing simple and difficult cases can be supplied, nor can the material presented in brief lecture courses furnish attainment of the objectives in the (1935) report."[50]

Ten years later the rift was no less severe as evidenced in a debate between orthodontic educators, deans, and dental educators at the A.A.D.S. meeting in Chicago:

> ...surely not all cases needing orthodontic service require the same degree of knowledge for treatment, and my judgment would leave me to believe that many cases would respond favorably to simple treatment.[51]

> ...every orthodontic department should conduct undergraduate diagnostic seminars for discussion of cases at all ages...[52]

> ...the undergraduate dental curriculum, as now constituted, is practically useless as a training ground even for graduate work in this subject, much less its successful practice. For years dental educators have been striving to make dental students biologically minded, to make them physicians of the oral cavity. But the dental student continues to be a mechanic.[53]

> ...commensurate training in orthodontics with other major dental subjects should be given to all undergraduates in dentistry as a fundamental requirement for graduation.[54]

> ...the dental school deans have been too complacent in accepting the dicta of the specialists and have not given the field the consideration it deserves as compared to other so-called major departments.[55]

By 1948 the American Association of Orthodontists (A.A.O.), formerly the American Society of Orthodontists, actively encouraged greater undergraduate training but was met with a dichotomy--the general practitioner desired more orthodontic information but the schools would not allocate more than a minimum of curriculum time. The Education Committee of the A.A.O. reported:

> It was impossible to convince the body (A.A.D.S.) of the essential importance of adequate clinical training. We insist that it is just as necessary to give thorough clinical training for orthodontic practice as it is for operative dentistry, prosthetics, or any other clinical branches of dentistry.[56]

In response to this surge of interest on the part of orthodontic educators, the A.A.D.S. surveyed all orthodontic programs in the United States and Canada to determine the status of undergraduate teaching. A Subcommittee on Teaching Orthodontics was appointed in 1948 by the Committee on Teaching to make a tentative report of this survey at the 1949 meeting of the A.A.D.S. The report stated, "Orthodontics should be regarded as an integral part of undergraduate dental training...and it should occupy a position as a clinical department."[57] One major problem noted was how to include in the undergraduate curriculum a considerable body of material that was fundamental to orthodontics and was at the same time basic to other aspects of general dentistry. The Subcommittee on Teaching Orthodontics requested the opportunity to demonstrate the teaching of material fundamental to orthodontics as well as fundamental to general dentistry by delivering a series of lectures at the 1950 A.A.D.S. meeting.[58] Five lectures were given at the French Lick, Indiana conference which resulted in a formal resolution of approval from the A.A.D.S. At the 1951 meeting of the A.A.D.S., the Education Committee of the A.A.O. combined its efforts with those of the Committee on Instruction in Orthodontics

of the A.A.D.S. The combined report recommended:

> That orthodontics should occupy a definite position as a clinical department in the dental course. As such it is suggested that the objectives are to train the student as follows:
>
> 1. To anticipate and detect malocclusion.
>
> 2. To take steps to prevent or intercept malocclusion where possible.
>
> 3. To treat simple cases or the simple immediate problems of complex cases.
>
> 4. To use this knowledge as a adjunct to procedures in all other phases of dental practice.
>
> 5. To know what cases to avoid and refer to more experienced men in the field.
>
> It is estimated that approximately 300 hours would be required to implement this clinical program. ...as a means of obtaining additional time...the total curriculum (should) be reevaluated.... The Committee suggests that the time seems ripe for a reappraisal of the dental curriculum with a view to breaking down its present highly departmentalized organization and a substitution, therefore, of a course of instruction aimed at the rendering of a complete service to the patient throughout life.[59]

The next major effort of orthodontic educators was a 1958 Workshop in Orthodontics conducted at the University of Michigan sponsored by the A.A.O. and the Kellogg Foundation. The objectives of undergraduate orthodontic education developed at the conference were stated as follows:

> To apply to the field of orthodontics the knowledge derived from the basic sciences, together with that from the field of orthodontics itself, to the end that the dental graduate would have the background necessary to recognize those conditions he is capable of managing. Specifically he should be able to:
>
> 1. Anticipate and detect malocclusion.
>
> 2. Take steps to prevent or intercept malocclusion where possible.

3. Use this knowledge as an adjunct to procedures in all other phases of dental practice.

4. Provide a basis for understanding the possibilities of orthodontic treatment.[60]

Adams observed in 1962,"It is interesting but disheartening to note that the same objectives, with slightly different wording, were suggested...in 1935, and that somewhat similar objectives eliminating treatment of similar cases were reported in...1958. It is even more disheartening to note that similar objectives were formulated as far back as 1904."[61] In a 1965 article, Knutson stated:

> Retrogression, not progress, characterizes the period since the 1951 recommendation on improved teaching of undergraduate orthodontics. The recommendation that 300 of the 4,400 hours be devoted to the teaching of orthodontics was preceded by a survey which showed that the undergraduate instruction in orthodontics in 45 dental schools varied from 14 to 314 hours, and that 37 of the 45 schools included some clinical activity. A similar study made by the Survey of Dentistry in 1958-1959, indicated that the number of clock hours ranged from 12 to 146, with a median of 40 hours, and that 20 of the 45 schools offered no clinical orthodontics.[62] If the recommendation of 300 clock hours is reasonable and valid, it is apparent that, with respect to education for orthodontics, our dental schools are educating for the 1940's rather than for the 1980's.[63]

The A.A.O. in 1960 advocated the same objectives as formulated in 1958 at the Michigan Workshop. By 1963, the A.A.O. added "...(the practitioner will be able) to recognize conditions which require advanced orthodontic treatment...."[64] The A.A.D.S. and the A.D.A. have continued to encourage expansion of both undergraduate and continuing education courses. Numerous conferences and meetings sponsored by the A.D.A., A.A.O., A.A.D.S., and the Canadian Dental Association continued to meet and debate the same questions throughout the 1960's and into the 1970's.[65-70] The literature contains numerous suggestions, modifications and debates.[71-82]

Ironically, the debate of what and how much orthodontics should be taught the dental student has continued with little consideration for the opinion of the general practitioner. Spengemen, in 1955, did evaluate opinions of general dentists in a small section of New York State by means of a written questionnaire. He referred to the problem of need versus education as he stated, "...the time available for the pursuit of orthodontic background has been debated considerably, but it is generally conceded by the most sanguine of our dental educators to be inadequate."[83] To evaluate local feeling, he sent questionnaires to a systematically derived sample of 1,015 New York dentists and received 402 replies. Although the methodology and sample did not allow generalizing beyond the geographic area investigated, this study did show an awareness among practitioners of the deficiencies in 1955 undergraduate education and demonstrated the eagerness among general practitioners to correct the situation.

Riedel, in 1967, surveyed by written questionnaire the attitudes of general practitioners in the State of Washington regarding undergraduate orthodontic education. The backgrounds, experience and education represented was widely diversified (the sample not limited to University of Washington graduates alone). By inspection, but without statistical analysis, the impression of dissatisfaction with undergraduate orthodontic training was evident in the replies.[84]

Teaching strategy has been just as confused and argued as the curricular content. For over thirty years, until 1963, the University of California had an elective program labeled Curriculum II which allowed the student to branch into pedodontics/orthodontics early in his dental career substituting concentration in children's dentistry for much of the traditional courses in prosthetics and restorative dentistry.[85] The California program was partly

traditional general dentistry, partly specialization with over 1,000 hours of orthodontic instruction. Harvard, U.C.L.A. and several other programs have concentrated heavily in orthodontics with 200-350 hours of undergraduate instruction.[86-90] The Washington program grew out of Brodie's suggestion for undergraduate orthodontic training with a somewhat limited instructional scope.[91] The University of British Columbia program evolved from a heavier undergraduate commitment of Harvard influence.[92] Dental programs throughout the United States and Canada have varied widely in objectives, goals, clinical exposure, coordination with other departments, and curriculum time. There has been a major lack of uniformity and conformity. The cry by general practitioners has continued that "orthodontists are holding back information." The public has demanded greater orthodontic services. The orthodontic educators in small undergraduate programs seemed to prefer either a small commitment because of philosophy and conviction or have been rebuffed by curriculum committees in their attempts to increase the program. Large and small undergraduate programs have been alike in a lack of direction, objectives, and a clear definition of exactly what level of ability the graduate general practitioner should possess.

Predoctoral Orthodontic Curriculum
University of British Columbia

The first class of dental students at the University of British Columbia graduated in 1968, a small group composed of only 7 members. Class size gradually increased to 18 in 1971 and to 34 in 1973. Orthodontics has played a major role in dental instruction at British Columbia as evidenced by the number of credit hours devoted to this discipline (Appendix A). Although the first class had somewhat less theory and more limited clinic exposure than ensuing classes, the total number of clock hours has always been over 150 (Appendix B)

To summarize the British Columbia program through 1973, the curriculum began during the second year with a one quarter lecture course of approximately 15 hours concentrating on orthodontic records, development of the dentition, growth and development, principles of tooth movement and orthodontic strategies. Classes 1968 to 1970 did not have the present second year course, much of the content of which was offered in ensuing courses. During two quarters of the third year, the students were exposed to an additional forty hours of lectures concerned primarily with diagnosis, treatment timing, patient evaluation, and treatment methodology with particular emphasis on the child and adolescent patient. A 50 to 60 clock hour laboratory course was given concurrently with the third year of lecture material. This preclinical experience focused on orthodontic records as well as construction of a few orthodontic appliances and other laboratory techniques. During the fourth year, extensive clinical exposure was undertaken with over 50 contact hours plus concurrent lectures and seminars.

It was the intent of the fourth year seminar program to raise student sophistication in orthodontic diagnostic and treatment methodology by giving the student the experience of obtaining diagnostic information, formulating a diagnosis and treatment plan, presenting the case in a formal seminar setting and either commencing appropriate treatment or referring the patient to an orthodontist. All patients chosen by the faculty for student use were rigidly screened for their suitability for general practitioner care. The students then accumulated complete records on each patient prior to case presentation. A few patients were accepted tentatively with the realization that they would reach only the diagnosis stage, with treatment of the malocclusion to be rendered by a specialist. It was felt particularly

useful for the student to review a wide variety of cases and to determine which were beyond the scope of the general practitioner. For several weeks of the first quarter during the senior year, the students presented their cases in small group seminars to teams of orthodontic faculty while their classmates observed. Cases were comprehensively evaluated, scrutinized and a decision made whether to treat in the dental school clinic or to refer to a specialist. Clinic experience throughout the remaining senior year ensued plus periodic seminar-lectures by the faculty. Cases which required long term treatment and/or observation were periodically presented by the students to the faculty on a one to one basis in the clinic with one or more classmates observing.

The intent of the British Columbia program has been to give the student certain basic information relative to growth, development, orthodontic diagnostic methodology, objectives and limitations of comprehensive orthodontic care, and the limitations of partial interceptive treatment. The student has been taught the utility of diagnostic records and the mechanics of patient evaluation. Clinical experience has been geared toward the recognition of developing malocclusion, interception and timing of treatment and referral to a specialist when appropriate.

Predoctoral Orthodontic Curriculum
University of Washington

Class size has been relative static during the years involved in this study, the average class size being 73. From the inception of dental training in 1947, orthodontics at the University of Washington has been a minor portion of the dental curriculum (Appendix A). A subcommittee of the School of Dentistry Curriculum Committee stated in a 1970 position paper:

> This department has enjoyed a relatively small percentage of curriculum time, and has in the past approached undergraduate education with the concept that orthodontic therapy should be relegated to the limited specialist. This opinion, shared by general practitioners, many teachers and most orthodontists, has influenced the structure of the curriculum and will likely continue to do so in the future.[93]

There were only slight modifications in the orthodontic program for graduates of 1968 through 1973 (Appendix B). In the second year, a ten hour lecture course was given with emphasis on tooth form, dentofacial growth, the development of occlusion and the history of orthodontics. During the third year, the focus of a ten hour lecture series was on the histology and physiology of tooth movement, the role of the general practitioner relative to interceptive treatment, orthodontic records, orthodontic diagnosis, muscles and their influence on occlusion, etiology of malocclusion and general principles of growth and development. In the case of some classes, much of this material was shifted into the fourth year. During the third year, each student was assigned to the orthodontic graduate clinic for a single two-hour period "...so as to give the student an individual opportunity to observe orthodontic treatment and observe instructors evaluating potential orthodontic patients."[94] The senior orthodontic program, for graduates of 1971 and earlier, consisted of a 20 hour block of lecture and discussion seminars focusing on interceptive treatment of orthodontic problems and a review of general principles of growth and development. No formal laboratory or clinic activity was conducted in orthodontics; however, consultation service between orthodontics and other clinical departments was available for discussion of particular orthodontic problems involving undergraduate clinic patients. The Department of Pedodontics handled all treatment of cases requiring space maintenance or minor tooth movement.

During these years of 20 to 40 student contact hours, the Department of Orthodontics stated the following objectives as the terminal behavior expected of the dental students:

1. To recognize those malocclusions that require orthodontic treatment.

2. To recognize gross aberrations of craniofacial growth and know their ultimate influence on dental occlusion.

3. To be able to differentiate between adequate and inadequate orthodontic therapeutic results and the factors associated with each as a guide for intelligent orthodontic consultations and referrals.

4. To be able to explain to the patient those conditions requiring orthodontic consultation and/or treatment, and the reason why, and to intelligently refer them for adequate consultation and/or treatment.

5. To recognize habits and other factors that will adversely affect the normal development of the dental occlusions and to be able to administer corrective therapy or intelligently refer for such therapy.

6. To be able to differentiate between those malocclusions that require general or comprehensive tooth movement, and those which require localized movement only.

The Department of Orthodontics at the University of Washington has been actively involved in formulating goals, intents and objectives consistent with those of the Curriculum Committee of the School of Dentistry. In 1966 the faculty of the Orthodontic Department listed their objectives of undergraduate education, adding several clinically related goals:

1. To recognize those malocclusions that require orthodontic treatment.

2. To recognize gross aberrations of craniofacial growth and know their ultimate influence on dental occlusion.

3. To be able to differentiate between adequate and inadequate orthodontic therapeutic results and the factors associated with each as a guide for intelligent referrals.

4. To be able to explain to the patient those conditions requiring orthodontic treatment and the reason why, and to intelligently refer them for adequate treatment.

5. To recognize habits or other factors that will adversely affect the normal development of the dental occlusion and be able to administer corrective therapy or intelligently refer for such therapy.

6. To be able to differentiate between those malocclusions that require general or comprehensive tooth movement and those that require localized tooth movement only.

7. To be able to differentiate between those malrelationships of teeth that require tipping versus bodily movement.

8. To be able to differentiate between the mechanical principles that will lead to the tipping of teeth versus the bodily movement of teeth.

9. To be able to design, construct, apply, and adjust several simple tooth moving devices that will provide tipping movement of localized teeth only as an adjunct to treatment procedures in all other phases of dental practice.

During the academic year 1970-1971, a subcommittee of the Curriculum Committee was formed to evaluate the Pedodontic-Orthodontic program and to propose appropriate modifications. The Subcommittee, composed of one member of the Orthodontic faculty, one from Pedodontics and several from the basic sciences, recommended that:

> ...(a need for) an integration of efforts and talents of the Departments of Orthodontics and Pedodontics is apparent to sharpen the skills and abilities of the student. It is suggested that an orthodontist be assigned on a joint appointment basis to coordinate the efforts of the two departments in this direction and that he be responsible for the development and and implementation of a program to bring into sharp focus the clinical abilities and limitations of the student.[95]

The Subcommittee, in addition to making recommendations about a combined Pedodontic-Orthodontic program, suggested the formation of a growth and development course taught conjointly by the Departments of Biological Structure, Pedodontics, Oral Biology and Orthodontics to cover much of that formerly taught in orthodontics. "The objective is to increase the students' understanding of the physical and psychological nature of the child, adolescent and adult."[96] In 1974, a 20 hour course somewhat following these recommendations was offered to freshman students. The Subcommittee also recommended the teaching of abnormal growth and development; however, by 1974 this course had not yet been approved.

During 1970-1971, the time of the Subcommittee action, there were 40 hours of orthodontic lecture time with 2 hours of observation in the graduate orthodontic clinic. Pedodontics had 50 hours of lectures, 20 hours of laboratory and 180 hours of clinic for a total of 260 hours. The Subcommittee recommended the formation of a conjoint Orthodontic-Pedodontic course of 35 lecture hours, 45 laboratory hours, plus 225 hours specifically labeled pedodontics and 26 hours specifically labeled orthodontics. Considering these recommendations, the Curriculum Committee instituted a new course known as Pediatric Dentistry which began during the academic year 1972-1973. This two quarter course taught during the second year, with a total of 60 hours rather than the 80 hours suggested, replaced several pedodontic and orthodontic courses plus it gave the student laboratory experience and an introduction to clinical diagnosis. Course objectives of Pediatric Dentistry 460 (lecture and laboratory--55 hours) and 461 (clinic experience--5 hours) were as follows:

1. To recognize the ideal occlusion in the primary, mixed, and permanent dentitions.

2. To know the general eruption progression of the primary and permanent teeth.

3. To be able to recognize dental and skeletal malocclusion and know symptoms of each.

4. To be able to evaluate space requirements in the mixed dentition as a guide to intelligent space management.

5. To have an understanding of the general physical growth of the human with emphasis on craniofacial development.

6. To understand the physiologic and mechanical principles of tooth movement.
   a. The concept of normal physiologic drift of the dentition.
   b. The concept of "bodily movement" of teeth and tipping movements of teeth.

7. To be able to diagnose situations in which limited tipping movements may be able to solve a specific problem; and to be able to design and construct appliances to do the same.
   a. Developing crossbites, anterior and posterior
   b. Ectopic eruption of teeth where adequate space exists
   c. Adjunct in preparation for restorative work

8. To understand the psychological growth of the child in the preschool and elementary school age groups with regard to the management of their behavior in the dental environment.

9. To be able to evaluate the state of oral hygiene of the school age child and develop methods of instruction for the child and his parents in effective oral hygiene.

10. To know the essential components of the oral and radiographic examination of the child with emphasis on treatment planning for various ages.

The Curriculum Committee established that the orthodontic clinic experience would remain within the Department of Pedodontics, and that orthodontic input would continue in the form of consultation services. No time specifically for orthodontics was authorized by the Curriculum Committee.

During the academic year 1973-1974, the Department of Orthodontics offered an elective course in minor tooth movement to interested third and fourth year students. In addition to 10 hours of lectures, faculty from the Department of Orthodontics were available for clinic supervision of patients involved with these procedures. Graduates of 1973 and earlier did not receive this course or the Pediatric Dentistry program.

Thus, the intent of the University of Washington orthodontic program shifted from 40 hours or less of lectures with no significant laboratory or clinic involvement for graduates of 1973 and earlier to a conjoint approach with the Department of Pedodontics. The emphasis during the Pediatric Dentistry 60 clock hours of instruction has been on the comprehensive care of the child and adolescent with restorative and developmental information combined in the program. The course in Pediatric Dentistry included lecture, laboratory and an introductory clinic contact. Subsequent clinic time remained through the Department of Pedodontics with the Department of Orthodontics remaining in a consultation capacity. Minor tooth movement procedures were taught on an elective basis beginning in 1973-1974 with orthodontic faculty providing clinic coverage.

Contribution of the Present Study

Determining the appropriate content and proper amount of predoctoral orthodontics in the dental curriculum has been an issue perplexing dental educators, practitioners and the dental profession since the inception of orthodontics as a specialty. Understandably, the specialist has reasoned that only with extensive advanced training can the practitioner hope to comprehend the complexities of malocclusion, recognize developing

discrepancies, institute appropriate treatment and monitor progress. Many specialists viewed even the large undergraduate programs of 200-300 hours as wholly inadequate, favoring minimal instruction in mechanics with emphasis on recognition and diagnosis. Orthodontists often viewed generalists as narrowly oriented throughout dental school and subsequently into practice toward the providing of a restorative service, only superficially appreciating the need for comprehensive diagnosis. The main fear has been lack of competency--the rendering of inept treatment. General practitioners have felt that they should be equipped to provide at least some service to the overwhelming majority of patients who need care but cannot or would not seek specialty treatment.

This study was designed to provide curriculum building groups with evidence often overlooked in curriculum design--the thoughts, opinions and attitudes of general practitioners.

CHAPTER III

DESIGN OF THE STUDY

In order to obtain information as to the personal, educational, professional and attitudinal variables, a survey questionnaire was developed. In addition, an in-depth personal interview was performed to focus on specific curricular opinion relative to undergraduate orthodontic education.

Subjects

Of the North American population of dental students, graduates of two dental schools, the University of British Columbia and the University of Washington, were selected to represent the extremes of undergraduate orthodontic curriculum time. Both dental schools are highly respected institutions with similar reputations for graduating competent dentists. Admission standards are similar as are the ages and range of potential ability of entering students (Appendix A).

University of British Columbia School of Dentistry graduates from 1968 to 1973 (N=105) who were currently in general practice (specialists excluded) formed one group. University of Washington School of Dentistry graduates from the same years (N=432) who were currently in general practice (specialists excluded) formed the second group.

Schools

The University of British Columbia undergraduate orthodontic curriculum consisted of a program of approximately 200 student-faculty contact hours. In addition to lecture material involving malocclusion recognition, diagnosis,

treatment, limitations of treatment, and orthodontic mechanics, the students were involved with an extensive clinical program (Appendix B).

The University of Washington predoctoral orthodontic program had been much less extensive with a total curriculum time of 20 to 40 hours. The emphasis was primarily on growth and development concepts with limited exposure to the rationale and method of interceptive treatment. No laboratory or clinical experience was offered (Appendix B).

Instruments

Two survey instruments were developed to evaluate the attitudes and opinions of the two groups, a written questionnaire and a personal interview. Questions were prepared in cooperation with the Department of Orthodontics, University of British Columbia School of Dentistry and the University of Washington School of Dentistry Departments of Orthodontics and Pedodontics.

The survey questionnaire used two types of structured questions, multiple choice and multiple point rating scales (Appendix C). Questions focused on descriptive information, such as, year and place of graduation, location of the dental practice, plus questions designed to evaluate the respondents' perceptions of the areas of excess and weakness in dental education, areas of greater patient need and demand for particular services, specialist - general practitioner cooperation, the status of dental health care, and interest in continuing education.

The personal interview utilized both closed- and open-ended questions to elicit the practitioners' attitudes concerning the future of dentistry, dental education and the role of the general dentist with emphasis on the adequacy of the orthodontic education received as preparation for general

practice (Appendix D). An attempt was made to glean the practitioners' attitudes concerning practice effectiveness in orthodontics and pedodontics by probing for the following: the ability to recognize, diagnose, treat and refer properly; the importance of this education within the dental school curriculum; the degree of specialty communication and the rapport and effectiveness of this communication; and finally, the personal professional needs of the generalist in the area of total health care for the non-adult.

Procedures

Questionnaire

Instrument content and the clarity of the presentation were assessed initially by having several practitioners and instructors from areas of orthodontics, pedodontics and general practice informally rate the content of each question and the overall format.

Pilot test: A sample of ten recent graduates (1968-1973) of North American dental schools, other than the University of Washington or University of British Columbia who were practicing in the Seattle area, were asked to respond to the proposed questionnaire. Each was asked to note questions which seemed ambiguous, omissions of questions which should have been asked, and any other constructive points for improvement. These respondents were each subsequently interviewed to further probe for ambiguity in the questionnaire and to specifically determine if the questionnaire produced data relevant to the research questions.

Each graduate received a cover letter accompanying the questionnaire which described the study, explained its value in redirecting the future British Columbia and Washington programs, and insured the anonymity of the respondent (Appendix E). The recipient's name was requested as well as an

indication of his being either a general practitioner or a specialist (the latter were excluded from statistical evaluation). The questionnaires were returned to the researcher, who removed the identification information from the questionnaire prior to evaluation. The identifying information was used to determine non-respondents who were then sent a follow-up questionnaire two weeks after the initial mailing (Appendix F). At the end of five weeks following the initial mailing, the collection of replies was stopped and the data key punched.

Of 432 University of Washington graduates surveyed, 335 responded, 2 were omitted because of deficiencies in the completion of the questionnaire and 15 were returned because of incorrect addresses for an 80 percent response rate; of those responding, 18 were not general practitioners. In the British Columbia group, 105 graduates were mailed questionnaires, 86 responded, 2 were omitted because of deficiencies and 5 could not be located for an 84 percent response rate; of those responding, 2 were not general practitioners.

Approximately ten percent of the non-respondents were telephoned to check the similarity of their responses on certain key items against those who did respond. Additionally, each of the sample of non-respondents was questioned as to the reason for not responding, probing for indications of weakness or personal objection to the questionnaire itself.

Interview

Pilot test: The interview was initially tested by submitting several practitioners and instructors from areas of orthodontics, pedodontics and general practice to the interview and having them discuss the content and method used. After suggestions were incorporated, a sub-sample of three urban practice graduates from the University of British Columbia and the

University of Washington, who had responded to the questionnaire, were exposed to the interview and their reactions and suggestions obtained.

Of those who had responded to the questionnaire, a sample of 15 graduates from the University of British Columbia and 20 from the University of Washington who were practicing general dentistry in either Seattle, Washington, Vancouver, British Columbia, or the suburban communities of these cities and who were not currently on the faculty of a dental school were randomly selected from the group of individuals who completed the survey questionnaire. Practitioners of these two metropolitan areas were singled out because it was felt that they had similar urban characteristics in regard to the range of their patients' needs and desires, access of patients to the general practitioner, and access to specialists. Both cities are leading cultural centers, have university dental schools, are of similar size, are geographically close and culturally similar. Each subject was contacted by telephone, the study explained, its value in the redesigning of the universities' curriculum discussed, the respondent's anonymity insured and an appointment arranged for a personal interview.

Limitations

Questionnaire

Several potential threats to internal and external validity emerge in a survey questionnaire of this type. The selection threat was a danger but because of the similarity of admission standards and educational backgrounds of students at the two institutions, it was assumed that the two groups were educationally similar. However, certain other characteristics affecting selection such as race, socioeconomic background, and state or nationality differences could be considered obstacles to the comparability of

graduates. The location of the general practice could have predisposed the respondent to answer questions in a particular manner; for example, rural practitioners may have been forced to be more knowledgable about orthodontics than urban respondents since patients may not have had access to the specialist.

Experimental mortality could have been a source of invalidity. Perhaps a significantly greater percentage from one of the schools entered the specialties thereby significantly reducing the precentage of respondents from each graduating class; however, this was not found to be the case. History, events occurring outside the formal coursework, could have affected validity. If short postgraduate courses were encouraged and the advice followed by one of the groups, results could have been affected. Information received in other courses or the orientation of the entire dental program could account for differences between groups. Selection-maturation interaction was considered a potential threat assuming one of the schools might have drawn their students from a different age/maturity group. However, in this case the percentage of pre-degree students versus those entering with baccalaureate degrees was quite similar.

The quality of teaching was assumed to be comparable between the two schools. However, it was not unreasonable to assume that there may have been substantial differences between individual instructors or between departments in the ability to promote learning. It was also possible that through modification of teaching strategy curriculum time was markedly reduced or increased.

Generalizing to the population of dental schools and dental students was a question of judgment. Supposedly through accreditation procedures, the North American dental schools are similar in quality and are composed

of comparable students, an assumption that may not be accurate. Finally, some of the respondents may have been influenced, or sensitized, by the emotional nature of the questions at issue in the questionnaire. Many general practitioners are vocal, adamant opponents or proponents of major curriculum revision relative to specialty education. This attitude could have clouded the accurate interpretation and response to questions posed to those surveyed.

Personal Interview

Several threats to internal and external validity were potential sources of inaccuracy in the interview portion of the study. As with the survey questionnaire, the comparability of graduates of the two schools was of major concern. As stated in the assumptions section of Chapter I, the researcher assumed similarity of education, sociological background and type of patient between the two groups, assumptions which could be challenged. By having chosen urban practitioners, the study should have eliminated responses which would have reflected geographic peculiarities in patient characteristics or access to specialists.

The two major sources of invalidity were experimentor and respondent bias. Care was exercised by the researcher in communicating the questions and recording the responses in such a way as to avoid confusion, prejudice, and misinterpretation - constant dangers of an open interview technique. Finally, subjects were encouraged to make clear accurate responses as free as possible from the emotionalism which often warps conversations, meetings and conferences on this emotional subject of predoctoral orthodontic curriculum.

Analysis of Data

Questionnaire

Frequency counts and percentage responses were the major means of presentation of the questionnaire data. Nonparametric statistics were used in this study since parametric statistics make several assumptions about population parameters which could not be satisfied.[97] None of these assumptions were adequately met by the data in this study, therefore, nonparametric statistics were employed even though it was realized that the results would be less powerful. One might feel that parametric statistics could be employed if the sample were large enough, the level of significance set high and bipolar questions considered interval in nature.[98] Considering the nature of the survey questions and the rather definite violation of other parametric assumptions, nonparametric statistics were felt more appropriate and therefore utilized throughout.[99]

Chi-square analysis was used to determine if the groups were significantly different; that is, the statistical technique was used to determine if the samples should be regarded as having come from the same population. The test has the limitation that expected frequencies in each cell should not be too small. Cochran recommends that for X^2 tests with df larger than 1, fewer than 20 percent of the cells should have an expected frequency of less than 5, and no cell should have an expected frequency of less than 1.[100] Although the N in this study might be considered sufficiently large, the minimum assumptions of this test were violated in some cases possibly leading to erroneous conclusions.

Discriminate analysis was employed with several questions to rank order those factors which most differentiated between British Columbia and Washington respondents.[101, 102] When breaking the variables down further

to consider population of the community as well as school attended, other more sophisticated tests could have been used, such as the Kruskal-Wallis test, but this test was eliminated because of the large number of ties. The discriminate analysis, being parametric, was also suspect since the data violated parametric assumptions but it was more likely to be useful than the nonparametric variety of tests.

Crosstabulations were used to compare answers from several different sections of the questionnaire. To strengthen the statistical analysis of this section, correlational techniques were employed. The Kendall rank correlation coefficient (tau) was felt most suitable for the type of data being analyzed. The Pearson rank correlation coefficient was less appropriate being parametric in nature. The Spearman rank correlation coefficient was also considered since when compared with the most powerful parametric correlation, the Pearson, is about 91 percent as efficient.[103] "...both the Spearman and Kendall tests have the same power to detect the existence of association in the population...both equally powerful in rejecting the null hypothesis as they make equivalent use of the information in the data."[104] However, the Kendall was chosen since it is less affected by ties.[105] "When used on data to which the Pearson r is properly applicable, both the Kendall and Spearman have efficiency of 91 percent. That is, the Kendall is approximately as sensitive a test of the existence of association between two variables in a bivariate normal population with a sample of 100 cases as is the Pearson with 91 cases."[106, 107]

Personal Interview

It was felt that evaluation of data obtained from an interview of this type was best assessed by means of qualitative content analysis.[108]

"...content analysis is employed as a diagnostic tool for making specific inferences about some aspect of the speaker's purposive behavior.... Qualitative analysis of a limited number of crucial communications may often yield better clues to the particular intentions of a particular speaker at one moment in time than more standardized quantitative methods."[109] "...the inference--each time it is made--is based on the presence of a theme, not the frequency of its occurrence...."[110] "Qualitative analysis is more likely to take them (components of complex materials) in the large on the assumption that meanings preside in the totality of the impression, the Gestalt, and not in the atomistic combination of measurable units."[111] Thus, general trends and themes as well as deviation from the general consensus were explored and analyzed in an attempt to gleen interrelationships between the dental school attended and subsequent practice activities and attitudes.

Summary

Graduates of two dental schools, the University of Washington and the University of British Columbia, who completed their training between 1968 and 1973 were surveyed by written questionnaire to assess opinions regarding the following: quality and quantity of dental education received in each clinical department, areas of patient need for specific dental procedures and the dentists' ability to meet these needs based on dental school training, specific activities performed in the dentists' personal dental practices, interest in continuing education, and opinion on current controversial issues within the profession. An 80 percent return rate was obtained from Washington graduates while 84 percent were returned from the British Columbia group. Parametric and non-parametric statistics were employed in addition to

frequency counts and means to dissect out interrelationships between education, year of graduation, population of the community where the dentists were practicing, and the respondent's opinions on specific issues. An in-depth personal interview was conducted of a subsample of those general practitioners responding to the questionnaire (20 from Washington and 15 from British Columbia) which focused on specific issues concerning the orthodontic education received during dental school as a preparation for the realities of private practice. Qualitative content analysis was used to determine agreement and disagreement, probe for generalizations, consistent themes, etc.

CHAPTER IV

RESULTS AND DISCUSSION OF MAJOR FINDINGS

As presented in Chapter III, 333 graduate dentists from the University of Washington responded to the written questionnaire, of which 315 were general practitioners, while from British Columbia 86 responded, 82 being general practitioners (Appendix C). Of those individuals who responded to the questionnaire, a random sample of 15 graduates from the University of British Columbia and 20 from the University of Washington who were practicing in either Seattle, Washington, Vancouver, British Columbia, or the surburban communities of these cities were selected to participate in an in-depth personal interview (Appendix D).

Since the primary purpose of this study was to obtain curriculum guidelines for predoctoral orthodontic instruction at the School of Dentistry, University of Washington, it was considered appropriate to consider the general dentist, an often neglected source of curricular input, and elicit his opinion relative to dental school education as related to the needs of private practice. Comparison of graduates from two dental schools with markedly different orthodontic undergraduate experience was felt to be a reasonable way of assessing personal perception of performance, ability and attitude. In addition to questions specifically related to orthodontics, data on demographic, curricular, and attitudinal variables were included to better delineate differences between graduates of the two schools.

In this chapter opinion variables were described with statistical comparisons of pertinent groupings made in order to determine significant differences between variables. It should be noted that the N used in many

of the tabulations differed from the total indicated earlier as the number of general practitioners returning the survey. The reason for this apparent discrepancy was that in many of the comparisons the specific item being examined was not answered. The reader is referred to Appendix G for a complete list of response frequencies to each written questionnaire item. Comments from the personal interviews, presented as quotations, were also included in this chapter.

As presented in Chapter I, the questionnaire and interview were designed to answer the following research questions:

1. What is the degree of discrepancy between the perceived role of the general practitioner regarding orthodontics and his ability to fulfill this role based on his dental education?

2. What are the areas of strength and weakness in dental education?

3. What effect does the amount of orthodontic curriculum content have on the effectiveness and attitude of the dental graduate?

Perceived Role and Role Performance

Role of the General Practitioner

University of British Columbia and University of Washington graduates were in agreement as to the general practitioners' responsibility for recognizing the existence of orthodontic problems among their patients. In regard to treatment, however, there was considerable controversy. Although both groups agreed that treatment of minor problems and interception of developing malocclusion were primary roles of the general practitioner, in general the Washington graduate seemed more inclined

to become involved in treatment of more advanced cases. The British Columbia view might best be summarized by the following quotation:

> We're doing sophisticated dentistry in this part of the world and I don't think you can do everything well....I can give a better service by meeting the patients first, seeing what their needs are, and referring them.

The responsibility and limit of general practitioner treatment has been an issue that has been receiving considerable debate. One Washington graduate made an interesting comment in this regard, a comment to which orthodontic departments might well address themselves:

> I'd like to see the Orthodontic Department decide what they think the general practitioner should be doing rather than have the general practitioner take some course that a renegade orthodontist is giving for X number of dollars and then the dentist going into full treatment (of his patients).

Both groups seemed to be aware of their limited knowledge and inability to deliver more advanced comprehensive orthodontic care. A few from British Columbia indicated that they were involved in some degree of partial treatment while over half of the Washington group indicated that they were already or planned to become involved in more advanced therapy. The following comments from Washington practitioners illustrate this philosophical difference:

> I could do the patient a service. I might be able to do it for a smaller fee--I don't have specialty training to have to pay for. It's a real service you can do.

> One reason I'd like to know more is so I can do some form of compromise. Orthodontists often try to do too much.

Orthodontic Need, Competency, and Curriculum Importance

To determine differences between the graduates of Washington and British Columbia, areas of dental tasks often regarded as specialty activities were rated as to patient need for the service, the competency in

performing the procedure as personally perceived by the respondent and the relative importance of teaching the item in the general dental curriculum (Tables 1-3).

Serial extraction: No significant difference between graduates of the two schools was noted in this category. Regarding need, about half of the replies were in the occasional category while 30 percent of the responses were rated as frequent. Self appraisal of competency was positive in both cases with 48 percent of the Washington group and 52 percent of the British Columbia group feeling themselves competent while 41 percent of the former and 35 percent of the latter felt reluctant to undertake this activity. In both cases the majority felt the item was a very important part of the curriculum.

TABLE 1

QUESTION C - PATIENTS' NEED

Dental Procedures	School	Response Percentage			Chi-Square
		Frequent	Occasional	Rare	$p \leq .01$ df=2 $X^2=9.21$
Serial Extraction	Wa.	32.2	47.1	20.7	2.92
	B.C.	30.5	56.1	13.4	
Multibanded orthodontics	Wa.	36.8	40.6	22.5	2.53
	B.C.	39.0	46.3	14.6	
Limited tooth movement (removable appliances)	Wa.	36.9	55.4	7.6	.26
	B.C.	36.6	57.3	6.1	
Limited tooth movement	Wa.	31.8	51.3	16.9	5.12
	B.C.	25.6	64.6	9.8	
Habit correction	Wa.	11.9	51.3	36.9	.34
	B.C.	11.0	54.9	34.1	

TABLE 2

QUESTION C - COMPETENCY

Dental Procedures	School	Response Percentage			Chi-Square
		Competent	Reluctant to Undertake	Would Not Undertake	$p \leq .01$ df=2 $X^2=9.21$
Serial Extraction	Wa.	48.1	40.8	11.1	.79
	B.C.	52.4	35.4	12.2	
Multibanded orthodontics	Wa.	4.1	11.7	84.1	1.01
	B.C.	3.7	15.9	80.5	
Limited tooth movement (removable appliances)	Wa.	43.6	49.0	7.3	14.36 *
	B.C.	67.1	29.3	3.7	
Limited tooth movement (banding, headgear, etc.)	Wa.	11.8	43.0	45.2	19.62 *
	B.C.	28.0	48.8	23.2	
Habit correction	Wa.	26.4	52.4	21.2	23.64 *
	B.C.	52.4	41.5	6.1	

*Statistically significant at $p \leq .01$

TABLE 3

QUESTION C - CURRICULUM IMPORTANCE

Dental Procedures	School	Response Percentage			Chi-Square
		Very Important	Not Mandatory	Specialty Item	$p \leq .01$ df=2 $X^2=9.21$
Serial Extraction	Wa.	67.8	23.2	8.9	1.54
	B.C.	74.4	17.1	8.5	
Multibanded orthodontics	Wa.	11.7	20.6	67.6	2.57
	B.C.	13.4	28.0	58.5	
Limited tooth movement (removable appliances)	Wa.	72.9	21.3	5.7	5.31
	B.C.	84.1	14.6	1.2	
Limited tooth movement (banding, headgear, etc.)	Wa.	38.1	27.6	34.3	17.99 *
	B.C.	60.5	27.2	12.3	
Habit correction	Wa.	39.2	40.2	20.6	30.48 *
	B.C.	72.8	22.2	4.9	

*Statistically significant at $p \leq .01$

Multibanded orthodontics: Again, no significant difference was found between groups in this area. In both cases patient need was rated frequent in approximately 40 percent of the replies while over 80 percent of both groups felt unqualified to handle this procedure, most of the remaining respondents being reluctant to undertake such comprehensive care. The majority of both groups felt that education in this area was an item which should be taught only to the specialist while over 20 percent felt that it was not mandatory in the undergraduate curriculum.

Limited tooth movement (removable appliances): No significant difference in replies was noted between the two groups relative to patient need. Both groups had a 37 percent reply in the frequent category with 55-58 percent in the occasional grouping. However, when it came to treatment there was a significant difference in reply. As a group, the British Columbia respondents had a greater feeling of competency with 67 percent in the competent category versus 44 percent for Washington, while most of the remaining replies for both groups were in the reluctant category. Regarding curriculum importance, both groups were highly favorable to this type of information, 84 percent from British Columbia and 73 percent from Washington rating this item very important.

Limited tooth movement (fixed appliances): Both groups were in close agreement concerning the need for fixed appliance therapy for limited tooth movement. Over 50 percent of both groups rated this as an occasional procedure, the majority of the remaining replies from both groups being in the frequent category. Considerable divergence existed in regard to treatment. In both cases, slightly less than half of the respondents were reluctant to undertake these procedures while most of the remaining Washington group would not undertake treatment. In the British Columbia case, there was about equal difference of opinion between those who considered themselves

competent and those who would not undertake treatment. Regarding curriculum importance, the British Columbia group seemed more inclined to favor instruction in this area with 61 percent replying that it was very important while only 38 percent from Washington replied in this way. The Washington group seemed nearly evenly split between categories while the British Columbia group was more definate in desiring the information.

Habit correction: No significant difference relative to need was found between the two groups. Slightly more than half felt that such treatment was merely occasional while the majority of the remaining respondents felt that rare need was more typical. Regarding self-perceived treatment ability, the British Columbia respondent typically felt more competent to handle the problem. More from Washington predominated in the reluctant category while very few of the British Columbia graduates responded in the incompetent area.

Discriminate analysis: In an attempt to decipher which of the foregoing items in orthodontics relative to need, competency and curricular importance most discriminated between the British Columbia and Washington graduates, the statistical technique of Discriminate Analysis was employed. As illustrated in Table 4, when comparing the replies of the two school groups, the most discriminating items involved the curriculum importance of habit correction followed by competency in limited banding, multibanding and habit correction. When population was also considered, as shown in Table 5, the curriculum importance of habit correction and competency in limited banding remained as the most discriminating items but the need for serial extraction, habit correction and limited banding rose in level of discrimination between groups. Thus, the curriculum importance of habit correction and competency in limited banding were those items which elicited the greatest divergence of opinion between the two groups of graduates regardless of the population of the community of the respondents.

TABLE 4

QUESTION C - DISCRIMINATE ANALYSIS

NEED, COMPETENCY AND CURRICULUM IMPORTANCE OF ORTHODONTIC ACTIVITIES

RANK ORDERED BY VARIABLES OF SCHOOL ATTENDED

1.	Habit correction	- curriculum importance	(Most Discriminating)
2.	Limited banding	- competency	
3.	Multibanding	- competency	
4.	Habit correction	- competency	
5.	Habit correction	- need	
6.	Multibanding	- need	
7.	Limited banding	- need	
8.	Limited banding	- curriculum importance	
9.	Removable appliances	- curriculum importance	
10.	Removable appliances	- competency	
11.	Serial extraction	- need	
12.	Serial extraction	- curriculum importance	
13.	Serial extraction	- competency	
14.	Multibanding	- curriculum importance	
15.	Removable appliances	- need	(Least Discriminating)

TABLE 5

QUESTION C - DISCRIMINATE ANALYSIS

NEED, COMPETENCY AND CURRICULUM IMPORTANCE OF ORTHODONTIC ACTIVITIES RANK ORDERED BY VARIABLES OF SCHOOL ATTENDED AND POPULATION OF COMMUNITY *

1.	Habit correction	- curriculum importance	(Most Discriminating)
2.	Limited banding	- competency	
3.	Serial extraction	- need	
4.	Habit correction	- need	
5.	Limited banding	- need	
6.	Multibanding	- curriculum importance	
7.	Multibanding	- need	
8.	Multibanding	- competency	
9.	Habit correction	- competency	
10.	Limited banding	- curriculum importance	
11.	Removable appliances	- curriculum importance	
12.	Removable appliances	- competency	
13.	Serial extraction	- competency	
14.	Removable appliances	- need	
15.	Serial extraction	- curriculum importance	(Least Discriminating)

*Washington and British Columbia graduates each represented by three population groups (Question J).

Adequacy of Curriculum Content

Dental Education

Regarding the respondents' perception of the curriculum content in the various clinical disciplines of dentistry relative to the personal needs of private practice following graduation, there were several areas of divergence between those graduating from the two schools surveyed (Table 6).

Community Dentistry: The British Columbia graduate typically rated time in this area as about right with a 77 percent response in this category, the remaining individuals about equally split between too much and too little content. The Washington graduates exhibited much greater divergence with 48 percent in the adequate category and the majority of the remaining respondents feeling that the time spent was inadequate. Chi-square analysis showed a significant difference between the two groups.

Crown and Bridge: Washington respondents, in general, felt that the area of fixed prosthodontics contained about the correct amount of content with an 84 percent response rate. Very few responded that too much time was spent. The British Columbia group was almost evenly split between about right and too little content with 55 percent and 42 percent respectively. At the .01 level, there was a significant difference between graduates of the two schools.

Diagnosis: Considerable divergence between groups was evidenced by the 70 percent approval of the content received by the British Columbia group compared to 40 percent by the Washington contingent. In both cases very few responded that too much content was involved.

Endodontics: No significant difference was found between the two groups

in this category of root canal therapy. The overwhelming majority from both programs indicated that the program was about right. Ninety percent from Washington and 88 percent from British Columbia were in this category with most of the remaining entries feeling too little time was spent.

TABLE 6

QUESTION B - CURRICULUM CONTENT

Clinical Discipline	School	Response Percentage			Chi-Square
		Too Much	About Right	Too Little	$p \leq .01$ df=2 $X^2=9.21$
Community Dentistry	Wa.	15.5	47.6	36.9	23.3 *
	B.C.	11.5	76.9	11.5	
Crown and Bridge	Wa.	1.6	83.7	14.7	31.3 *
	B.C.	3.7	54.9	41.5	
Diagnosis	Wa.	1.3	39.8	58.9	40.39 *
	B.C.	2.4	78.0	19.5	
Endodontics	Wa.	0.6	90.4	8.9	8.06
	B.C.	4.9	87.7	7.4	
Operative Dentistry	Wa.	19.0	78.1	2.9	6.49
	B.C.	7.3	89.0	3.7	
Oral Surgery	Wa.	1.9	27.9	70.2	38.30 *
	B.C.	1.2	64.6	34.1	
Orthodontics	Wa.	0.6	5.5	93.9	136.25 *
	B.C.	2.4	58.5	39.0	
Pedodontics	Wa.	1.3	88.8	9.9	33.73 *
	B.C.	13.4	67.1	19.5	
Periodontics	Wa.	5.7	55.4	38.9	11.78 *
	B.C.	15.9	58.5	25.6	
Removable Pros.	Wa.	23.6	68.1	8.3	129.37 *
	B.C.	6.1	29.4	64.6	

* Statistically significant at $p \leq .01$

Operative Dentistry: Graduates of the two schools were not significantly different with 79 percent from Washington and 90 percent from British Columbia feeling that the program was properly structured. In both cases, the remaining replies were in the excess category.

Oral Surgery: The majority of Washington graduates felt that Oral Surgery was inadequate with a 70 percent response in this category compared to only 34 percent from British Columbia. The remaining individuals generally felt that the program was adequate with 28 percent from Washington and 65 percent from British Columbia stating that the content was about right. Statistically, there was a significant difference between the two groups.

Orthodontics: Washington and British Columbia graduates showed a highly significant difference of opinion regarding orthodontic education. Ninety-four percent of the Washington group felt that the program was inadequate contrasted with 39 percent from British Columbia. Fifty-nine percent of the British Columbia respondents were content with the content while 6 percent of Washington replies were in this category.

Pedodontics: Children's dentistry was an area of significant difference between groups with 89 percent from Washington and 68 percent from British Columbia indicating that the program was about right. The remaining respondents from British Columbia were almost evenly divided between too much and too little content while among the Washington group there was more feeling of too little time spent in the program.

Periodontics: Although there was a statistically significant difference between the two groups, only a bare majority from Washington and British Columbia felt that Periodontics had sufficient content with the responses being 55 percent and 59 percent respectively. The remaining Washington group were clustered primarily in the inadequate category while British Columbia respondents were somewhat evenly split between too much and too

little content.

Removable Prosthodontics: In the clinical area of partial and full removable dentures there was considerable difference between groups. In general, the Washington graduate felt that this area was adequate in content while the British Columbia graduate was less content with 29 percent feeling that it was sufficient and 65 percent indicating that it was inadequate, a considerable divergence between the two schools.

Discriminate Analysis: The results of Discriminate Analysis are included in Table 7. Orthodontics was found to be the clinical discipline which showed the most dissimilarity between Washington and British Columbia graduates. Removable Prosthodontics was the next most discriminating discipline followed by Oral Surgery.

As illustrated in Table 8, when the graduates of the two schools were broken down by population, as was done in question J of the questionnaire, Orthodontics and Removable Prosthodontics still remained as the most discriminating clinical disciplines in comparing groups. Thus, when contrasting graduates of these two schools, the area of Orthodontics followed by Removable Prosthodontics were those disciplines which elicited the greatest divergence of opinion between the two groups of graduates regardless of the population of the community of the respondents.

Orthodontic Curriculum

Among Washington graduates interviewed, there was unanimous agreement that the 20 to 40 hours of undergraduate orthodontic experience was inadequate. Comments include the following:

> It was worse than inadequate. It was a complete zero.

> Patients and parents ask questions and I feel that I don't know anything.

TABLE 7

QUESTION B - DISCRIMINATE ANALYSIS

CLINICAL DISCIPLINES RANK ORDERED BY VARIABLE OF SCHOOL ATTENDED	
1. Orthodontics	(Most Discriminating)
2. Removable Prosthodontics	
3. Oral Surgery	
4. Diagnosis	
5. Crown and Bridge	
6. Periodontics	
7. Operative Dentistry	
8. Endodontics	
9. Community Dentistry	
10. Pedodontics	(Least Discriminating)

TABLE 8

QUESTION B - DISCRIMINATE ANALYSIS

CLINICAL DISCIPLINES RANK ORDERED BY VARIABLES OF SCHOOL ATTENDED AND POPULATION OF COMMUNITY *	
1. Orthodontics	(Most Discriminating)
2. Removable Prosthodontics	
3. Crown and Bridge	
4. Oral Surgery	
5. Diagnosis	
6. Periodontics	
7. Community Dentistry	
8. Endodontics	
9. Operative Dentistry	
10. Pedodontics	(Least Discriminating)

*Washington and British Columbia graduates each represented by three population groups (Question J).

> My training hasn't even enabled me to tell if something is going to be wrong or not.

> You wouldn't have known that we even had orthodontics.

The British Columbia graduate reacted in quite a different manner with high praise for the orthodontic program.

> I really think that it was adequate. If you wanted to do more orthodontics then you really should specialize.

> The organization of the course was very well done.

> I feel that I am quite competent to diagnose what is a complicated case and what is a simple case.

> Orthodontics was the best organized course that I had. This is not just my opinion but the opinion of others as well.

> The orthodontic education was adequate to be able to recognize problems and know what should be referred.

When asked about the material covered in the orthodontic curriculum, both groups of respondents had specific comments and criticism of value to curriculum planning. Regarding areas which received too much emphasis, the Washington practitioners frequently mentioned growth and development, cephalometrics (a radiographic analysis method used for diagnostic purposes) and basic science theory. Typical comments were as follows:

> The course was way over the head of the student--it just wasn't applicable.

> They went a little more into theory than is useful for the general practitioner. I understand that you've got to have the theory before you can have the practice but I don't have either now. Thirty hours of nothing is thirty hours of nothing.

British Columbia respondents were reasonably content with the program with few exceptions. Some indicated that the emphasis placed on laboratory exercises and records may have been carried to excess, but in general there was a reasonable balance.

Both groups were in agreement that more clinical experience would have been helpful. Clinical involvement including examination of patients, diagnosis of greater varieties of malocclusion and more patient treatment were common suggestions. Comments from Washington graduates follow:

> A sorely lacking area was clinical orthodontics. I can't even remember seeing a full case banded at the university. The opportunity just was never there.

> The school really let us down when they taught us crown and bridge but didn't teach us molar uprighting.

Both groups stressed the need for more clinic and lecture time spent in learning minor tooth movement procedures. The Washington graduate stressed the need for interceptive treatment of developing problems and was eager for more information, realizing that his preparation had been inadequate.

Many of the British Columbia group were very interested in increasing the curriculum time in diagnosis and treatment planning as the following comments illustrate:

> You need more time in diagnosis and treatment planning... not treatment.

> You need more theory as to why and how the orthodontist achieves his goal.

> I need more (information) on treatment philosophy and theories of treatment....Many patients put a lot of faith in the general practitioner--more than a specialist. One is put in the position of explaining what is needed...and if you don't know what he is going to do...then you fall a little short in credibility.

> If you're not aware of the end result or the type of treatment, you feel a little remiss about requesting that they go.

> There are always questions...and it's valuable to know what full banding is all about and what is trying to be obtained. It isn't essential to be able to utilize the devices.

Most of the British Columbia graduates, being content with the curriculum time spent in orthodontics, had few suggestions for reduction of time in other

disciplines. Among Washington graduates, the majority complained of the excessive time spent in certain preclinical laboratory courses, prosthetics being the most frequently mentioned. Several noted excesses in certain phases of clinical restorative practice, such as the time spent with gold foil restorations. A few commented on the time involved with basic science courses, which they indicated might better be taught prior to dental school. A few comments from Washington graduates follow:

> What's more important, minor tooth movement so you can put in a bridge that is something you'd put in your own mouth or waxing up crowns that you'll never do in practice.

> The time spent in prosthetics lab was ridiculous.

Very few from either school were familiar with orthodontic programs at other institutions. In fact, none of those interviewed knew of the program taught at the other school being surveyed. Most assumed that the programs elsewhere were similar to the one they had received.

Both groups were asked if some phases of dental education might be better handled by means of a self-instructional approach. Most commented on the poor efficiency of learning which characterized their dental school education but few respondents commented on self-instruction as an alternative strategy. With the exception of traditional textbook reference material, self-instructional techniques were almost non-existent at both schools. Not having been exposed to individualized learning, it could not be expected that enthusiasm for such methods would be evident. Many were satisfied with the traditional lecture method, but when questioned further, had little knowledge of other strategies.

Of those surveyed, all felt that the major share of orthodontic information should be given during dental school rather than following

graduation. British Columbia dentists responded to this issue with the following comments:

> I think orthodontics should be given to the dental student. I've really seen too many mutilated adult mouths that have been the attempts of general practitioners. If they had received the same course, they may have had a little more humility.
>
> If a difficulty arises, it is because the general practitioner hasn't had enough training in orthodontics.
>
> Diagnosis is the key. You can't make an accurate differential diagnosis unless you have a base, so I think it is essential to have it (orthodontics) in the undergraduate program.
>
> Every dentist needs that information.
>
> I wouldn't have wanted any less time in orthodontics.

Washington graduates responded with similar comments. Typical replies were as follows:

> Diagnosis and simple treatment should be taught in dental school with more advanced information learned through continuing education.
>
> You need a base. The school should be diagnostic.

An alternative method of dental education which has been proposed is labeled the "pathway" approach by which the student directs his interest and energy toward a specialty area early in his dental school career while reducing the usual amount of time in areas outside this specialty area. There was mixed reaction to this approach among graduates of both schools, the major concern being that the graduate would be less equipped to view the entire field of dentistry. Several felt that it would be too soon in the students' career to make such a choice--attitudes might well change with time and experience. Some were concerned that the student would not be able to change his mind, being prevented from reentering the traditional program.

A British Columbia graduate made several interesting and appropriate comments:

> If I had been channeled into orthodontics in the second year, by the time the end of the third year had come I'd have been going "snaky". Would it have been too late? Would I have to start over?

An adamant Washington graduate stated:

> I am opposed to the idea. We need more general practitioners, not more specialists. It sounds like a "short cut" to specialty training.

Practice Effectiveness and Personal Attitudes

Perception of Patient Need

Washington and British Columbia graduates differed in their perception of need for orthodontics among their children and adolescent patients. British Columbia respondents generally stated that 50 to 80 percent of their patients had a condition requiring orthodontic involvement, a percentage in agreement with current epidemiological data. The Washington graduate seemed to recognize a much smaller number of cases, typical estimates of need being 25 percent with a few ranging up to 50 percent. As one Washington graduate so aptly stated. "The more you know, the more you see."

Current Orthodontic Activities

Results of the interviews demonstrated that among Washington graduates there was active involvement in limited orthodontic treatment while the British Columbia dentist seemed somewhat less inclined to become involved in treatment. The personal interview demonstrated among both groups the general agreement that minor tooth movement was the area of greatest competency. Typically, the Washington dentist utilized commercial laboratory services to design and construct removable and fixed appliances

while the British Columbia graduate was more inclined to design his own appliance and limit treatment to simpler movements. Graduates of British Columbia utilized some headgear primarily for space regaining, not skeletal correction. Banded cases were considered the most difficult by both groups, the Washington graduate more inclined to become involved in these complicated procedures. Serial extraction, a complex diagnostic procedure, was being practiced routinely by both groups. British Columbia graduates were less inclined to proceed without consultation with a specialist than were Washington graduates. Apparently the additional training of the British Columbia graduates may have resulted in a more conservative attitude when the practitioner confronted areas beyond his competence.

Those from Washington involved in orthodontics were inclined to interpret orthodontic involvement as meaning treatment rather than diagnosis alone. Typical answers to questions regarding the reason for more involvement were as follows:

> It doesn't take long before they are booked up (specialists). There is so much need. It is certainly coming to the point where the general practitioner will be doing full treatment.

> There are some dentists after taking the Dental Institute Course (a proprietary continuing education series of lectures not associated with a university presented for general practitioners) who are qualified to do minor cases with full bands. They know what they're doing.

> You bet I'd like to treat more patients.

The minority view among Washington graduates was quite the opposite, the few practitioners so responding indicated a reluctance to become involved. A few exerpts from these conversations follow:

> Very few patients need serial extraction only.

> If you're not able to deliver the same product at the same quality then you shouldn't be doing it.

> I've seen dentists using removable appliances and really mess things up...what do you have--damage.

> I don't know what I'm doing. I refer out all...that I can't handle competently myself.

From both Washington and British Columbia, practitioners who were doing treatment mentioned several different reasons for involvement such as personal enjoyment, desire to help disadvantaged patients, and the high cost of orthodontics. All considered orthodontics as a legitimate general practitioner activity. Only a very few mentioned increased income as a reason for treating cases.

The British Columbia general practitioner, with a few exceptions, was more inclined to approach the question of orthodontic involvement as a diagnostic service, treatment to be rendered by the most appropriate person. For example, the following comments were recorded from different respondents:

> The most important part of orthodontics (for the general practitioner) is to recognize the problem.

> The important part I feel for the general practitioner is diagnosis, not treatment. We learned that very thoroughly.

> I personally think the general practitioner should prevent malocclusion but not treat malocclusion. A general practitioner should not go into bigger problems because he just doesn't have the knowledge.

> I am reluctant to undertake treatment unless I'm fairly certain of reasonable results to the patient, therefore, whenever I see a situation that appears fairly difficult, I tend to refer the patient to an orthodontist.

> I'm very conservative. If there is something I can't handle, I'm the first person to refer them to someone better qualified to handle it.

> Fairly complex treatment modalities can be gotten into very quickly, especially if you're looking a little deeper diagnostically....In nine out of ten cases the conditions involve quite seriously advanced orthodontic treatment.

Attitudes Concerning Specialists

Attitudes of general practitioners toward specialists in dentistry were assessed in Question D of the questionnaire. Analysis of Table 9 indicated that in all cases there were no significant differences between Washington and British Columbia graduates. All specialists were given high marks with the majority of replies in each case being in the satisfied categories. Of the five specialties considered, as a group the orthodontists fared the best while pedodontists were rated the lowest.

TABLE 9

QUESTION D - GENERAL PRACTITIONER/SPECIALIST

COOPERATION AND COMMUNICATION

Specialty	School	Response Percentage					Chi-Square
		Satisfied				Dissatisfied	$p \leq .05$ df=4
		1	2	3	4	5	$X^2=9.49$
Oral Surgeons	Wa.	56.6	29.5	9.9	3.0	1.0	4.51
	B.C.	58.8	20.0	16.3	3.8	1.3	
Orthodontists	Wa.	57.0	24.9	9.9	5.1	3.1	1.46
	B.C.	62.5	23.8	8.8	2.5	2.5	
Periodontists	Wa.	44.8	31.1	15.0	6.6	2.4	6.22
	B.C.	50.0	19.7	22.4	3.9	3.9	
Pedodontists	Wa.	44.8	28.2	21.4	3.2	2.4	4.31
	B.C.	40.8	22.5	32.4	1.4	2.8	
Endodontists	Wa.	52.5	29.1	15.7	1.1	1.5	2.62
	B.C.	51.4	24.3	18.9	1.4	4.1	

The personal interview pointed out that British Columbia general practitioners, in general, were reasonably pleased with their orthodontic colleagues. Specialist-general practitioner cooperation and communication were quite favorable and satisfactory. The one area of difficulty seemed to

be relative to oral hygiene during treatment, the following comments illustrating this concern:

> Some general practitioners, particularly some of us that are involved in preventive dentistry programs and are concerned about motivation and prevention..., are probably geared much higher than the orthodontist. The level at which we administer it (instruction)...is at a higher level of motivation. It is more rigid. In many instances I duplicate the preventive care for my orthodontic patients just to make sure.

> Who is taking the responsibility for the patient's hygiene?

The other area of concern among British Columbia practitioners was the orthodontists' apparent lack of interest in undertaking less than complete orthodontic treatment. Minor tooth movement, especially in adults was seemingly avoided.

Washington graduates had similar concern about hygiene and the specialists' lack of interest in minor treatment; however, the criticism was much more harsh in regard to the perceived attitude held by the orthodontic profession toward general practitioners as illustrated in the following statements:

> The profession (orthodontics) is definitely keeping information (from the general practitioner).

> The orthodontic profession is self protecting.

> The Orthodontic Department seemed reluctant to have the student do anything.

> The feeling that I got was that orthodontics was a very closed shop and they wanted us to go to graduate school to really know anything.

A few respondents from both schools complained that the finished cases were inadequately treated, damage to roots and periodontal structures had resulted from treatment, the orthodontist had a poor grasp of the concept of occlusion, and damage to the mandibular jaw joint often was the result

of improper orthodontic care. Unanimously, the respondents indicated that the fee was the major complaint of parents.

Suggestions for improvement of these problems centered around increasing the communication between specialist and general practitioners. Several graduates from British Columbia advised progress reports either by mail, by phone or in person which might facilitate general practitioner involvement in improving the hygiene problems. Washington graduates felt that the dental schools and the orthodontic profession must become more open in dealing with general practitioners and should make a greater effort to transmit educational information.

Both groups were referring patients to the orthodontic specialist for treatment. Only a very few were dissatisfied with the quality of care or commented on delays in getting their patient into a specialty practice for diagnosis. The majority of practitioners did not know the typical fees currently being charged by orthodontists, but most felt that the fee was probably fair, assuming that it was in line with other dental services. In fact, there seemed to be more concern about fees for other types of specialty service, periodontics being the most common category mentioned. A few Washington dentists had an extremely exaggerated view of current fees with a concomitant critical attitude toward the specialty. Interestingly, these individuals were also the ones most heavily involved in orthodontic treatment themselves.

When considering possible reasons for patients not receiving orthodontic care, both Washington and British Columbia graduates indicated that cost was perhaps the most important factor. There was general agreement that the low level of parent understanding and appreciation of the need for treatment was the second factor, a reason perhaps closely related to the third most

commonly mentioned reason--poor explanation on the part of the general practitioner. Several Washington practitioners indicated that they never mentioned orthodontics or recommended treatment until a parent specifically asked about the developing problem. The esthetic and psychological problems associated with wearing appliances were the next most common reasons for lack of treatment, although several did indicate that more patients in their practices seemed to be responding to peer pressure, actively seeking treatment regardless of need for therapy. None of those responding to the interview mentioned lack of orthodontists as the reason for not seeking treatment.

Summary and Findings

Summary

Three hundred fifteen general practitioner dentists who graduated from the University of Washington and eighty-two general practitioner dentists from the University of British Columbia, both groups of which graduated during the years 1968 to 1973, completed a written questionnaire concerning the nature of their practices. It was expected that knowledge of these variables would provide a comparison of graduates from two widely divergent orthodontic programs--information which would be valuable in redesigning the undergraduate orthodontic program at the University of Washington so as to better equip graduates for the needs and realities of private practice.

Twenty graduates from the University of Washington and fifteen from the University of British Columbia who responded to the survey questionnaire and who were practicing dentistry in Vancouver, British Columbia, or Seattle Washington were randomly selected to participate in an in-depth personal interview. Opinions and attitudes relative to the orthodontic education

received in dental school as well as associated questions regarding their personal practices were the focus areas of discussion.

Major Findings

The following findings were considered to be of major importance to the study:

1. The major role of the general practitioner as perceived by the British Columbia dentist was one of early recognition and diagnosis of malocclusion, not necessarily treatment. The Washington graduate was more inclined toward instituting some form of intervention.

2. No significant difference was noted between the perception of patient need for certain selected orthodontic services; however, a somewhat higher percentage from British Columbia rated themselves competent to perform these services. Although both groups tended to regard curriculum content in these areas as very important, a higher and statistically significant percentage from British Columbia rated several curricular items as very important.

3. Over 90 percent of Washington respondents felt that the amount of curriculum content that they had received in orthodontics was inadequate, a significant difference from the British Columbia group, the majority of whom felt that the program had about the correct amount of curriculum content.

4. In analyzing the amount of time in all clinical disciplines, orthodontics was the area which most discriminated between the Washington and British Columbia graduates. When population of the practice community was introduced as an additional variable, orthodontics was still the most discriminating clinical discipline.

5. Both groups would have preferred greater clinic involvement especially in minor tooth movement procedures.

6. Both Washington and British Columbia respondents felt that orthodontics must be taught as a major portion of the dental curriculum, all graduates thoroughly grounded in the principles of recognition, diagnosis and treatment of minor discrepancies.

7. British Columbia practitioners recognized a higher need for general orthodontic care than Washington dentists.

8. British Columbia graduates, as a group, were actively involved in recognition and diagnosis of orthodontic problems with timely referral of appropriate cases to orthodontic specialists. They typically were conservative in personally instituting treatment, their involvement limited to minor tooth movement and interceptive care of young patients.

9. University of Washington graduates more typically were involved in simple as well as more advanced orthodontic procedures with or without specialist consultation. As a group, they were inclined toward greater orthodontic involvement, intervention often in the form of treatment rather than referral. Treatment, not just diagnosis seemed to be the Washington graduates' direction and goal.

10. Both Washington and British Columbia graduates were quite satisfied with the care delivered by specialists, with orthodontists scored somewhat higher than other specialists in cooperation and communication.

11. Among both groups, the poor level or oral hygiene during treatment and the orthodontists' lack of interest in partial treatment were the practitioners' greatest complaints about orthodontics. In

addition, several Washington graduates felt that the orthodontic profession was holding back information from general practitioners.

12. In order of importance, the reasons for patients not seeking care were cost, low level of understanding among parents, inadequate explanation by the general dentist, and the psychological and esthetic problems associated with treatment.

CHAPTER V

RESULTS AND DISCUSSION OF SUPPLEMENTAL FINDINGS

Several items of interest, which did not pertain directly to the research questions listed in Chapter I, were elicited in the study.

Year of Graduation

As illustrated in Table 10, of those dentists who replied to the questionnaire 81 from British Columbia and 314 from Washington were general practitioners. The Washington group had a fairly constant return rate from each two-year graduation breakdown, 29 percent to 37 percent being the range of distribution. The British Columbia responses were much greater in return rate from the 1972-1973 group than the 1968-1971 years. This pattern from both schools would be expected since the British Columbia program was quite small in graduation class size until recently, while the Washington program has had a reasonably constant class size for many years.

TABLE 10

QUESTION G - YEAR OF GRADUATION

School	Frequency and Percentage			Total
	1972-73	1970-71	1968-69	
Wa.	115 (36.6)	108 (34.4)	91 (29.0)	314 (100)
B.C.	49 (60.5)	22 (27.2)	10 (12.3)	81 (100)

Year Practice Begun

Of those who responded to the questionnaire, approximately 60 percent from both schools had begun practice in 1972 or later; approximately 25 percent to 30 percent had begun between 1970 and 1971 (Table 11). Internships and government service may have accounted for some of this skewness among Washington graduates since post-doctoral activities often delayed the initiation of a private practice for 1 to 3 years. Among the British Columbia group, the larger class size in recent years may have accounted for the skewness of the replies.

TABLE 11

QUESTION H - YEAR PRACTICE BEGUN

School	Frequency and Percentage			Total
	1972-74	1970-71	1968-69	
Wa.	176 (57.9)	99 (32.6)	29 (9.5)	304 (100)
B.C.	52 (64.2)	20 (24.7)	9 (11.1)	81 (100)

Patient Age

In an effort to determine the age distribution within the practices of practitioners from both schools, an attempt was made to categorize patients by age. As shown in Table 12, young patients under the age of 12 were a minority of most practices. Washington graduates were significantly different from British Columbia respondents with 47 percent indicating that this age group represented less than 20 percent of their practices while 45 percent indicated that 20-40 percent of their practices were in

this age group. The British Columbia group showed a somewhat higher percentage of this young age group with 33 percent and 45 percent in these two categories.

In the 12 to 18 year age bracket, no significant difference was seen between Washington and British Columbia graduates. Most practitioners indicated that this group represented 20-40 percent of their practices with most of the remaining replies in the under 20 percent category.

The two groups of graduates demonstrated a significant difference in reply to the adult breakdown. Washington respondents definately showed a larger adult practice with 77 percent indicating more than 40 percent of their practices were composed of adults while 58 percent from British Columbia responded in this manner.

TABLE 12

QUESTION 1 - PATIENT AGE

Patient Age	School	Response Percentage					Chi-Square
		Under 20%	20-40%	40-60%	60-80%	Over 80%	$p \leq .01$ df=4 $X^2=13.28$
Under Age 12	Wa.	47.2	45.1	5.9	1.0	0.7	16.18 *
	B.C.	32.5	45.0	18.8	2.5	1.3	
Age 12 to 18	Wa.	38.5	55.0	6.2	0.3	0.0	11.66
	B.C.	30.2	43.1	4.9	0.3	0.0	
Over Age 18	Wa.	3.2	19.7	36.9	18.8	21.4	20.68 *
	B.C.	1.3	40.5	39.2	11.4	7.6	

*Significant at $p \leq .01$.

Population of Community

As illustrated in Table 13, almost half of the respondents from Washington were practicing in communities under 25,000 population while there

was nearly equal spread among the two larger categories. However, in the case of British Columbia respondents, there was near equal distribution between the smaller, middle size and large urban communities.

TABLE 13

QUESTION J - POPULATION OF COMMUNITY

School	Frequency and Percentage			Total
	Under 25,000	25,000 - 100,000	Over 100,000	
Wa.	150 (48.5)	78 (25.2)	81 (26.2)	309 (100)
B.C.	27 (33.3)	24 (29.6)	30 (37.0)	81 (100)

Adequacy of Curriculum Content in Orthodontics Contrasted with Other Variables

The intent of this section was to focus on the adequacy of the orthodontic curriculum at the Universities of Washington and British Columbia as this perception relates to variables of year of graduation, population of community and patient age breakdown of private practice.

Year of Graduation

In the case of Washington graduates, there was no significant difference between reply based on year of graduation with a correlation coefficient which was not predictive. Graduates of all years were generally discontent with their program. The British Columbia group demonstrated a significant difference in attitude based on year of graduation. Seventy-one percent from the 1972-73 group felt that the content was about right while only 41 percent and 30 percent of the two earlier groups felt content (Table 14).

TABLE 14

CROSS TABULATION OF

ORTHODONTIC CURRICULUM CONTENT

AND YEAR OF GRADUATION

Curriculum Content	School	Response Frequency and Percentage by Year of Graduation		
		1973 - 1972	1971 - 1970	1969 - 1968
Too Much	Wa.	2 (1.8)	0 (0.0)	0 (0.0)
	B.C.	0 (0.0)	2 (9.1)	0 (0.0)
About Right	Wa.	8 (7.1)	5 (4.7)	4 (4.4)
	B.C.	35 (71.4)	9 (40.9)	3 (30.0)
Too Little	Wa.	103 (91.2)	101 (95.3)	87 (95.6)
	B.C.	14 (28.6)	11 (50.0)	7 (70.0)
Total	Wa.	113 (100.0)	106 (100.0)	91 (100.0)
	B.C.	49 (100.0)	22 (100.0)	10 (100.0)
Chi-Square	Wa.	$X^2 = 4.46$	p = .347	df = 4
	B.C.	$X^2 = 13.80$	p = .008	df = 4
Kendall	Wa.	$\gamma = .0752$	p = .025	
	B.C.	$\gamma = .2402$	p = .001	

Population of Community

The Washington group was quite consistent in opinion regardless of population size of the community. Over 90 percent from rural, semi-urban and large urban communities felt that the curriculum content was inadequate. Among the British Columbia group there was somewhat less consistency but no significant difference between population groups and a correlation which was not predictive. Seventy percent of the rural group and 60 percent of the urban group felt that the content was adequate while among the 25,000 - 100,000 population groups there was near equal split between too little and adequate curriculum content (Table 15).

Combining the replies of the two schools and comparing population with content demonstrated that over 76 percent of the respondents from all population groups felt that too little content was offered in orthodontics with no significant difference based on population (Table 16).

Patient Age

Among both Washington and British Columbia graduates, most noted that patients under age 12 comprised under 40 percent of their practices. Regardless of the percent of practice, among the Washington group there was no significant difference in reply as to the amount of curriculum content received, the majority indicating that the program was inadequate. Although there was no significant difference between reply when considering how great a percentage of young children comprised the practice among British Columbia respondents, there was more of a trend to score too little content as the number of children in the practice increased. Thirty-one percent of the under 20 percent group, 44 percent of the 20-40 percent group and 53 percent of the 40-60 percent category stated that the content was inadequate (Table 17).

TABLE 15

CROSS TABULATION OF

ORTHODONTIC CURRICULUM CONTENT

AND POPULATION OF COMMUNITY

Curriculum Content	School	Response Frequency and Percentage By Population		
		Under 25,000	25,000 - 100,000	Over 100,000
Too Much	Wa.	1 (0.7)	1 (1.3)	0 (0.0)
	B.C.	0 (0.0)	0 (0.0)	2 (6.7)
About Right	Wa.	7 (4.7)	4 (5.1)	6 (7.6)
	B.C.	19 (70.4)	10 (41.7)	18 (60.0)
Too Little	Wa.	140 (94.6)	73 (93.6)	73 (92.4)
	B.C.	8 (29.6)	14 (58.3)	10 (33.3)
Total	Wa.	148 (100.0)	78 (100.0)	79 (100.0)
	B.C.	27 (100.0)	24 (100.0)	30 (100.0)
Chi-Square	Wa.	$X^2 = 1.808$	p = .771	df = 4
	B.C.	$X^2 = 8.346$	p = .080	df = 4
Kendall	Wa.	$\gamma = -.0344$	p = .186	
	B.C.	$\gamma = -.0116$	p = .440	

TABLE 16

CROSS TABULATION OF

ORTHODONTIC CURRICULUM CONTENT

AND POPULATION OF COMMUNITY

WASHINGTON AND BRITISH COLUMBIA COMBINED

Curriculum Content	Response Frequency and Percentage By Population		
	Under 25,000	25,000 - 100,000	Over 100,000
Too Much	1 (0.6)	1 (1.0)	2 (1.8)
About Right	26 (14.9)	14 (13.7)	24 (22.0)
Too Little	148 (84.6)	87 (85.3)	83 (76.1)
Total	175 (100.0)	102 (100.0)	109 (100.0)
Chi-Square	$X^2 = 4.52$	p = .340	df = 4
Kendall	$\gamma = -.0783$	p = .011	

TABLE 17

CROSS TABULATION OF

ORTHODONTIC CURRICULUM CONTENT AND

PERCENTAGE OF PRACTICE UNDER AGE 12

Curriculum Content	School	Response Frequency and Percentage by Percentage of Practice				
		Under 20%	20 - 40%	40 - 60%	60 - 80%	Over 80%
Too Much	Wa.	0 (0.0)	1 (0.8)	0 (0.0)	0 (0.0)	0 (0.0)
	B.C.	2 (7.7)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
About Right	Wa.	10 (7.5)	5 (3.9)	1 (5.9)	0 (0.0)	0 (0.0)
	B.C.	16 (61.5)	20 (55.6)	7 (46.7)	2 (100.0)	1 (100.0)
Too Little	Wa.	124 (92.5)	123 (95.3)	16 (94.1)	3 (100.0)	2 (100.0)
	B.C.	8 (30.8)	16 (44.4)	8 (53.3)	0 (0.0)	0 (0.0)
Total	Wa.	134 (100.0)	129 (100.0)	17 (100.0)	3 (100.0)	2 (100.0)
	B.C.	26 (100.0)	36 (100.0)	15 (100.0)	2 (100.0)	1 (100.0)

Chi-Square	Wa.	$X^2 = 3.076$	$p = .930$	$df = 8$
	B.C.	$X^2 = 8.098$	$p = .424$	$df = 8$
Kendall	Wa.	$\gamma = .0555$	$p = .082$	
	B.C.	$\gamma = .1233$	$p = .053$	

The Washington respondents uniformly stated that the curriculum content was inadequate regardless of the number of patients in their practices between ages 12 and 18. No significant difference was noted among the British Columbia sample and no clear trends were evident except that opinion varied between too much and too little curriculum content (Table 18).

There was no significant differences within British Columbia and Washington groups when the percent of adult patients of their practices were considered. The Washington respondents uniformly replied that the orthodontic curriculum was inadequate. Among the British Columbia group there was a trend toward considering the curriculum adequate as more adults comprised the practice, although the correlation was not predictive (Table 19).

Continuing Education

Orthodontics

Although there was no significant difference between the replies of the two groups of respondents, there was a clear trend toward a desire for more education in the area of orthodontics; 43 percent of both groups replied that they were very interested in more information (Table 20).

Most Washington graduates felt that the curriculum content was inadequate, the majority being interested in further information with over 70 percent scoring in the interested categories. British Columbia graduates, whether they were content with or desired more curriculum time, also tended to desire more information with over 70 percent in the interested categories. Chi-square analysis showed that there was a significant difference among replies within each responding group. This

TABLE 18

CROSS TABULATION OF

ORTHODONTIC CURRICULUM CONTENT AND

PERCENTAGE OF PRACTICE AGE 12 TO 18

Curriculum Content	School	Response Frequency and Percentage by Percentage of Practice				
		Under 20%	20 - 40%	40 - 60%	60 - 80%	Over 80%
Too Much	Wa.	1 (0.9)	1 (0.6)	0 (0.0)	0 (0.0)	0 (0.0)
	B.C.	1 (6.7)	1 (1.7)	0 (0.0)	0 (0.0)	0 (0.0)
About Right	Wa.	9 (8.3)	5 (3.1)	1 (5.6)	1 (100.0)	0 (0.0)
	B.C.	11 (73.3)	32 (53.3)	3 (60.0)	0 (0.0)	0 (0.0)
Too Little	Wa.	99 (90.8)	153 (96.2)	17 (94.4)	0 (0.0)	0 (0.0)
	B.C.	3 (20.0)	27 (45.0)	2 (40.0)	0 (0.0)	0 (0.0)
Total	Wa.	109 (100.0)	159 (100.0)	18 (100.0)	1 (100.0)	0 (0.0)
	B.C.	15 (100.0)	60 (100.0)	5 (100.0)	0 (0.0)	0 (0.0)

Chi-Square	Wa.	$X^2 = 20.44$	$p = .002$	$df = 6$
	B.C.	$X^2 = 4.04$	$p = .399$	$df = 4$
Kendall	Wa.	$\gamma = .0657$	$p = .049$	
	B.C.	$\gamma = .1749$	$p = .011$	

TABLE 19

CROSS TABULATION OF

ORTHODONTIC CURRICULUM CONTENT AND

PERCENTAGE OF PRACTICE OVER AGE 18

Curriculum Content	School	Response Frequency and Percentage by Percentage of Practice				
		Under 20%	20 - 40%	40 - 60%	60 - 80%	Over 80%
Too Much	Wa.	0 (0.0)	0 (0.0)	0 (0.0)	1 (1.7)	1 (1.6)
	B.C.	0 (0.0)	0 (0.0)	1 (3.2)	1 (11.1)	0 (0.0)
About Right	Wa.	2 (20.0)	3 (5.0)	4 (3.5)	1 (1.7)	6 (9.4)
	B.C.	1 (100.0)	15 (46.9)	19 (61.3)	5 (55.6)	5 (83.3)
Too Little	Wa.	8 (80.0)	57 (95.0)	109 (96.5)	56 (96.6)	57 (89.1)
	B.C.	0 (0.0)	17 (53.1)	11 (35.5)	3 (33.3)	1 (16.7)
Total	Wa.	10 (100.0)	60 (100.0)	113 (100.0)	58 (100.0)	64 (100.0)
	B.C.	1 (100.0)	32 (100.0)	31 (100.0)	9 (100.0)	6 (100.0)

Chi-Square	Wa.	$X^2 = 11.74$	p = .163	df = 8
	B.C.	$X^2 = 8.21$	p = .413	df = 8
Kendall	Wa.	$\gamma = -.0347$	p = .184	
	B.C.	$\gamma = -.1960$	p = .006	

was confirmed by the Kendall tau, which indicated good precision of the data; however, the level of correlation was not predictive (Table 21).

TABLE 20

QUESTION F - INTEREST IN CONTINUING EDUCATION

Clinical Discipline	School	Response Percentage					Chi-Square
		Interest				Not Int.	$p \leq .05$ df=4
		1	2	3	4	5	$X^2=9.49$
Orthodontics	Wa.	42.7	27.7	15.3	7.3	7.0	1.65
	B.C.	42.7	32.9	14.6	4.9	4.9	

From the personal interviews, it was noted that among Washington graduates there was active interest in orthodontic continuing education. The direction of training among at least half of those surveyed was toward comprehensive treatment through proprietary training programs not associated with a university or specialty organization. At a minimum, all of those interviewed from Washington were interested in more information concerning diagnosis, treatment of minor tooth movement cases, and interceptive treatment of children and adolescents.

Desire for continuing education was less enthusiastic among British Columbia dentists, as evidenced by the following comments:

> My reason for pursuing continuing education courses in orthodontics was that I felt the training we got at the University of British Columbia was adequate to give me a good head start.

> Yes, I would like more information. If I felt that I could make an accurate diagnosis...then I would like to learn practical appliances--the actual appliances of doing orthodontics. If I don't have the ability to make an accurate diagnosis, then of course, I need that first.

TABLE 21

CROSS TABULATION OF ORTHODONTICS

CURRICULUM CONTENT AND INTEREST IN CONTINUING EDUCATION

Curriculum Content	School	Response Frequency and Percentage				
		Very Interested				Not Interested
		1	2	3	4	5
Too Much	Wa.	0 (0.0)	0 (0.0)	2 (0.6)	0 (0.0)	0 (0.0)
	B.C.	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	2 (2.4)
About Right	Wa.	2 (0.6)	1 (0.3)	5 (1.6)	2 (0.6)	7 (2.3)
	B.C.	17 (20.7)	17 (20.7)	11 (13.4)	1 (1.2)	2 (2.4)
Too Little	Wa.	131 (42.3)	86 (27.7)	39 (12.6)	21 (6.8)	14 (4.5)
	B.C.	18 (22.0)	10 (12.2)	1 (1.2)	3 (3.7)	0 (0.0)
Total	Wa.	133 (42.9)	87 (28.1)	46 (14.8)	23 (7.4)	21 (6.8)
	B.C.	35 (42.7)	27 (32.9)	12 (14.6)	4 (4.9)	4 (4.9)

Chi-Square	Wa.	$X^2 = 53.48$	p = .000	df = 8
	B.C.	$X^2 = 49.94$	p = .000	df = 8
Kendall	Wa.	$\gamma = -.2493$	p = .001	
	B.C.	$\gamma = -.2655$	p = .001	

> No, I'd rather spend my time in other phases of dentistry. My orthodontic training was quite adequate.

> No, I learned more than enough orthodontics at University of British Columbia.

Several British Columbia graduates were interested in minor tooth movement information to facilitate uprighting of abutment teeth prior to fixed bridgework, but unlike the Washington group, there was little interest in learning about comprehensive orthodontic treatment.

Few practitioners from either school had been involved with more than a few one day lectures on orthodontic subjects. Most felt that this method of obtaining information was poor with little gained; on the other hand, they were in agreement that they were more inclined to pursue lectures than read textbooks, journals, or use self instructional audiovisual packages.

The Washington graduates involved in study groups or continuous proprietary programs seemed enthusiastic about this approach as compared to the single lecture method. British Columbia graduates had the opportunity of joining study clubs in various disciplines held at the University of British Columbia Dental School. These groups met for sessions of six or more hours once a month for several years. Each study group had one or more specialists teaching the course, the general practitioners bringing private patients from their own practices into the continuing education clinic of the dental school. The study club affiliated with the university giving the practitioner theoretical as well as clinic involvement was definitely favored by the British Columbia practitioner as illustrated by the following comment:

> I've been in an endodontic study club for two years. There is no question that this is the only way to immerse yourself into a field and get really good exposure and experience.

The British Columbia dentists were actively involved in continuing education with most spending one to two days per month out of their offices for continuing education courses. Although not inclined toward a concentrated orthodontic program at the time of the survey, most were planning to obtain greater information in the future. Washington graduates were actively pursuing continuing education in a wide variety of clinical areas as well, although at a reduced level of one or less days per month with a seeming preference toward evening courses, thereby not deducting from the normal working hours.

The majority from both schools felt that knowledge of compromise care would be a desirable part of the predoctoral curriculum. A few were somewhat negative toward this approach reasoning that the case may be no better off or even worse than without treatment. One British Columbia graduate stated the following:

> If you let the parents know that there is a possible compromise, there tends to be too ready an acceptance for a compromise while if you offer to the patient a good treatment...you find a greater degree of acceptance. If you offer two alternatives, too often the patient is going to choose the cheapest one even though it is not good enough.

Lewis, in a 1970 study, surveyed the continuing education preferences of Washington, Alaska, Idaho, Montana and Utah dentists.[112] The findings of Lewis regarding the interest in orthodontic continuing education were confirmed in this survey of practitioners. He noted that orthodontics was third in frequency of request for continuing education among Washington respondents following requests for information concerning practice management and prosthodontics.

Community Dentistry

A lack of interest was shown by both groups in this area of continuing

education with over 30 percent from both groups neutral, the majority of the remaining replies clustered toward the not interested categories.

Crown and Bridge

There was no significant difference between the two groups on this item. There seemed to be interest in continuing education with over 65 percent from both groups somewhat to very interested in further education.

Diagnosis

On this item the two responding groups showed a statistically significant difference in reply. Although both groups were clustered toward the interested portion of the range, the Washington group demonstrated a somewhat greater desire for more information with 46 percent responding very interested against 31 percent from British Columbia.

Endodontics

No significant difference was noted between schools on this clinical item with most replies in the interested portion of the range. Very few recorded low interest.

Operative Dentistry

Both groups showed a wide dispersion of opinion in regard to more continuing education in restorative dentistry. The greatest number from both groups was in the neutral area at slightly over 30 percent with no significant difference between groups.

Oral Surgery

Again, there was a considerable difference of opinion within each group regarding this clinical area, but no significant difference between groups. Neutral to interested categories held the majority of replies.

TABLE 22

QUESTION F - INTEREST IN CONTINUING EDUCATION

Clinical Discipline	School	Response Percentage					Chi-Square
		Interested				Not Int.	$p \leq .05$ df=4 $X^2=9.49$
		1	2	3	4	5	
Community Dentistry	Wa.	11.9	14.8	33.8	21.2	18.3	2.44
	B. C.	9.9	9.9	33.3	27.2	19.8	
Crown and Bridge	Wa.	26.1	43.6	21.0	7.0	2.2	9.32
	B.C.	35.8	33.3	22.2	2.5	6.2	
Diagnosis	Wa.	46.3	36.4	15.0	1.6	0.6	18.21 *
	B.C.	31.3	33.8	28.8	1.3	5.0	
Endodontics	Wa.	34.3	38.4	21.6	4.1	1.6	3.77
	B.C.	32.9	36.6	23.2	2.4	4.9	
Operative Dentistry (single restorations)	Wa.	11.8	22.6	34.1	20.1	11.5	5.94
	B.C.	20.7	15.9	30.5	23.2	9.8	
Oral Surgery	Wa.	20.7	29.0	27.7	14.6	8.0	0.73
	B.C.	22.0	30.5	25.6	12.2	9.8	
Pedodontics	Wa.	24.8	31.5	30.6	8.0	5.1	7.18
	B.C.	24.4	19.5	34.1	12.6	7.3	
Personal & Practice Finances	Wa.	42.9	30.8	19.0	4.8	2.5	25.73 *
	B.C.	37.8	20.7	14.6	19.5	7.3	
Practice Management	Wa.	46.3	31.1	17.1	4.8	0.6	15.68 *
	B.C.	31.7	29.3	24.4	9.8	4.9	
Preventive Dentistry	Wa.	38.7	34.2	21.1	4.5	1.6	1.31
	B.C.	34.1	34.1	25.6	3.7	2.4	
Removable Pros.	Wa.	10.6	23.4	33.7	19.6	12.8	18.62 *
	B.C.	25.6	18.3	20.7	14.6	20.7	

*Statistically significant at $p \leq .05$.

Pedodontics

The majority of replies in this category were clustered in the neutral to interested areas, however, there was considerable dispersion throughout the range. No significant difference was noted.

Finances and Practice Management

Significant differences were noted in these areas. Although the trend among both groups was for more information, it was evident that the Washington group more strongly favored greater information.

Preventive Dentistry

No significant difference was noted between groups in this category but a trend among both groups of graduates was toward more education in preventive dentistry. Approximately 70 percent of both groups were interested in further education.

Removable Prosthodontics

A significant difference was noted in the area of partial and complete dentures. The Washington group was less inclined to be very interested or very disinterested in continuation of their education, the greatest frequency being in the neutral category. British Columbia graduates showed a wide range of opinion ranging from 26 percent very interested to 21 percent very disinterested in further continuing education.

Possible Developments in Dentistry

The initial question in the questionnaire dealt with several current social, political and educational issues of interest to Canadian and United States dentists (Table 23).

National Health Insurance

The issue of national health insurance is a subject of considerable debate both in the United States and Canada. Both groups of respondents had a wide range of opinion of this matter with a slightly higher percentage clustered in the neutral to slightly favorable categories. No significant difference was noted between the two school's graduates.

Reduced Dental Curriculum

Although a slightly higher percentage from both groups responded on the negative side to a reduction in the traditional four year to the frequently discussed three year dental program, there was considerable dispersion throughout the range. However, this opinion seemed contingent on having essentially the same total time as was used in the current program; that is, it was assumed that students would be in school during the entire year rather than the usual academic year of approximately nine months. There was a much greater negative opinion when the question of a true one year reduction of the dental curriculum was proposed with 67 percent of the Washington group and 61 percent of the British Columbia respondents replying in the category labeled very unfavorable. Again, there was no significant difference between the two groups.

Greater Use of Auxiliaries

Modern dental practice seems to be shifting toward a more efficient health care delivery system with greater emphasis on auxiliary utilization. The majority from both institutions surveyed felt favorable about the trend toward the dentist supervised team with 69 percent from Washington and 79 percent from British Columbia scoring either 1 or 2 on this item.

TABLE 23

QUESTION A - POSSIBLE DEVELOPMENTS IN DENTISTRY

Current Issues	School	Response Percentage					Chi-Square
		Favorable				Unfavorable	$p \leq .05$ df=4
		1	2	3	4	5	$X^2=9.49$
National health insurance	Wa.	17.4	23.9	23.9	16.1	18.7	4.01
	B.C.	18.8	26.3	25.0	7.5	22.5	
Three year dental curriculum (No summer vacations)	Wa.	10.5	12.7	21.0	24.5	31.2	7.29
	B.C.	13.6	11.1	14.8	16.0	44.4	
Three year dental curriculum (With summer vacations)	Wa.	3.2	4.5	6.1	19.6	66.7	5.53
	B.C.	8.9	6.3	6.3	17.7	60.8	
Auxiliaries restoring teeth	Wa.	25.1	30.5	19.0	13.3	12.1	3.10
	B.C.	28.4	27.2	22.2	7.4	14.8	
Dentist supervised treatment team	Wa.	37.3	31.5	17.8	8.9	4.5	5.01
	B.C.	42.5	36.3	13.8	2.5	5.0	
Mandatory relicensure	Wa.	8.4	11.6	22.2	22.5	35.4	32.91 *
	B.C.	25.9	23.5	21.0	11.1	18.5	
Specialty board examinations	Wa.	36.3	28.6	22.5	5.8	6.8	2.39
	B.C.	40.0	32.5	20.0	2.5	5.0	
Regional national reciprocity	Wa.	46.3	21.5	8.7	6.1	17.4	13.61 *
	B.C.	53.8	20.5	17.9	1.3	6.4	
Regional international reciprocity	Wa.	29.0	14.3	17.2	12.7	26.8	11.45 *
	B.C.	45.3	14.7	18.7	4.0	17.3	
G.P. allowed to practice all phases of dentistry	Wa.	67.3	21.3	8.3	2.2	1.0	6.98
	B.C.	81.0	9.9	6.2	1.2	1.2	
Specialists allowed to practice all phases of dentistry	Wa.	38.1	17.5	15.6	12.4	16.5	6.26
	B.C.	50.6	16.0	9.9	6.2	17.3	
Specialty certification required to receive third party payment	Wa.	10.9	8.9	19.5	14.6	46.0	6.48
	B.C.	19.5	10.4	22.1	7.8	40.4	

* Statistically significant at $p \leq .05$.

There was a divergence of opinion as to whether auxiliaries should actually be restoring teeth, working directly on patients rather than merely assisting the dentist. There were approximately 20 percent in the neutral range on this issue with 56 percent clustered in the favorable area from both schools.

Licensure

Throughout the health care industry there is a trend toward peer review and continuous reassessment of competency. To evaluate the graduates' attitude toward this trend, mandatory reiicensure was proposed in the questionnaire as a possible future eventuality. This particular issue pointed out the most dramatic difference in attitude between the two schools with the difference being significant. The majority of responses from Washington graduates ranged from neutral to very unfavorable with the greatest number being in this latter extreme category. The British Columbia graduate seemed to demonstrate the opposite view with approximately half being in the favorable categories and over 20 percent being neutral. Both groups seemed to be in closer agreement on the issue of specialty board examinations. Although British Columbia has had a mandatory licensure examination for the prospective specialist and Washington has not, 40 percent of the former and 36 percent of the latter were strongly in favor of such a requirement with approximately 50 percent of the respondents being either somewhat favorable or neutral on the subject.

Reciprocity

There has been a trend toward reduction of the restrictions against migration of a dentist from one state or province to another, with most of the legal barriers being revised by geographic areas rather than nationally.

For example, two or more states or provinces could agree that under certain circumstances of practice the dentist may migrate and establish practice with a minimum of reexamination requirements. Many regions have a common dental board, passage of which is honored in all the participating states or provinces. Regarding the questionnaire, there was a difference of opinion between Washington and British Columbia graduates; 46 percent from Washington and 54 percent from British Columbia were very favorable toward such a trend with over 20 percent from both groups somewhat favorable. However, over 17 percent from Washington were quite unfavorable toward such an eventuality thereby influencing the Chi-square statistic resulting in a significant difference between groups.

On the issue of international reciprocity, there was a statistically significant difference between the groups. Although both groups were divided on the matter, there was a trend toward more favorability on the part of the British Columbia group with over 45 percent replying very favorable while only 29 percent from Washington were in this category.

Specialty Practice

General practitioners have always shown a strong desire to retain their legal right to practice all phases of dentistry, including areas of specialty practice. As long as the practitioner did not attempt to indicate that he was a specialist through telephone listing, stationery, advertisement or other means, he was legally able to practice the entire range of dentistry. The response to this item in the questionnaire confirmed this view with 67 percent of the Washington group and 81 percent of the British Columbia respondents strongly in favor while 22 percent and 10 percent respectively of both groups were mildly favorable toward a continuing legal nonrestriction of practice.

There was greater variation in opinion as to whether the specialist should be allowed this same privilege. Slightly over half of both groups were somewhat favorable, but there was a large number neutral to unfavorable to such a trend.

As more third party insurance programs cover specialty activities, the problem of who should be eligible for payment has become a major issue. The general practitioner reasons that since he is legally able to perform the service regardless of training, he should be entitled to equal payment. The specialist typically states that only after advanced training in a recognized formal program should the practitioner endeavor to treat cases requiring specialty service, and, therefore, cannot receive payment without being qualified. Although the responses showed divergence of opinion among general practitioners, it was noted that 46 percent from Washington and 40 percent of the British Columbia group were strongly opposed to specialty certification as a prerequisite to third party payment. On all of these issues regarding restriction of practice there was no significant difference between responding graduates of the two schools.

Character of Practice

The personal interview demonstrated that active preventive dentistry programs were currently in effect in Washington and British Columbia practices. Most practitioners felt that the success of such motivational programs was limited to a minority of their patients but among those responding to preventive dentistry education there appeared to be a reduction in caries incidence and periodontal disease. Graduates of both schools saw a significant drop in removable prosthetic care along with increased public acceptance of quality restorative treatment and endodontic services. Many

felt that their practices might shift toward orthodontics but not because of preventive dentistry programs reducing the traditional sources of practice income and thus forcing the practitioner into orthodontics. The majority who were interested in providing more orthodontic service felt that their own interest in the field would be the reason for greater involvement.

Dental Health Care and Dental Education

Personal satisfaction with the quality of dental health care and the adequacy of dental education to prepare the practitioner to meet societies needs were issues studied in the survey questionnaire (Table 24).

TABLE 24

QUESTION D - PERSONAL SATISFACTION

Issues	School	Response Percentage					Chi-Square
		Satisfied				Dissatisfied	$p \leq .05$ df=4
		1	2	3	4	5	$X^2=9.49$
Your dental school education	Wa.	43.9	42.7	8.3	2.5	2.5	10.03 *
	B.C.	31.7	47.6	14.6	6.1	0.0	
National dental care	Wa.	1.3	11.5	37.7	33.2	16.3	2.89
	B.C.	2.5	13.8	28.8	35.0	20.0	
Dental care in your community	Wa.	12.1	34.5	33.5	16.3	3.5	6.36
	B.C.	11.1	24.7	45.7	12.3	6.2	
Dental care in your practice	Wa.	41.0	48.1	7.7	2.6	0.6	2.54
	B.C.	35.8	51.9	11.1	1.2	0.0	
Care of your children patients	Wa.	45.6	39.9	11.7	1.7	1.0	3.27
	B.C.	41.8	45.6	8.9	3.8	0.0	
Care of your adult patients	Wa.	44.1	44.4	7.7	2.9	1.0	4.08
	B.C.	37.5	51.3	10.0	0.0	1.3	
Care by dental specialists	Wa.	40.1	45.6	10.7	2.3	1.3	7.32
	B.C.	34.6	38.5	10.2	5.1	2.6	

* Statistically significant at $p \leq .05$.

Dental Education

Although 86 percent from Washington and 80 percent from British Columbia were somewhat to generally satisfied with their dental school education, there was a significant difference between groups as reflected in the dispersion within and between the remaining categories, especially within the Washington group.

National Dental Care

No significant differences were noted between respondents of the two schools on this issue with the majority of the replies clustered in the neutral to dissatisfied areas.

Dental Care in Your Community

Although there was a difference of opinion within each graduate group as to their satisfaction with dental care in their particular communities, there was no significant difference between groups on this item. Most respondents were clustered in the neutral to somewhat satisfied categories.

Dental Care in Your Practice

Both groups were inclined to be more satisfied with their own practice situation than either national or community health with 41 percent and 48 percent in the satisfied categories among the Washington group and 36 percent and 52 percent among British Columbia graduates. The trend continued when replying relative to child and adult patients within their personal practice with no significant difference between British Columbia and Washington respondents, most of the replies clustered in the satisfied area of the range.

Care by Specialists

General practitioners from both schools seemed to have a high regard for the care provided by dental specialists as 86 percent from Washington and 74 percent from British Columbia rated this service in the generally satisfied or somewhat satisfied categories.

Clinical Dentistry Activities

Several clinical areas, other than orthodontics, are considered by specialists to be specialty care activities as opposed to typical general practitioner services. This section was devoted to the general practitioners' assessment of patient need for these activities as well as their own competence in fulfilling this need (Tables 25-27).

Endodontics

Posterior endodontics: Although the majority of both groups felt that root canal therapy on posterior teeth was an area of frequent need among their patients, there was a significant difference between the two responding groups. However, regarding competency there was no significant difference, both groups regarding themselves as competent. Opinion relative to curriculum content was similar, over 80 percent of both groups feeling that this area was important.

Apicoectomy: Significant differences were noted in regard to surgical removal of root tips. Sixty percent of the Washington group felt an occasional need for such service while 49 percent of British Columbia graduates had this opinion, the majority of the remaining respondents rating the item as rare. There were significant differences in regard to competency, 83 percent from Washington feeling competent versus 62 percent from

TABLE 25

QUESTION C - PATIENTS' NEED

Dental Procedures	School	Response Percentage			Chi-Square
		Frequent	Occasional	Rare	$p \leq .01$ df=2 $X^2=9.21$
Posterior endodontics	Wa.	77.1	21.9	1.0	10.35 *
	B.C.	59.8	37.8	2.4	
Periodontal osseous surgery	Wa.	27.4	57.0	15.6	7.77
	B.C.	18.3	53.7	28.0	
Full-mouth reconstruction	Wa.	8.6	43.6	47.8	1.07
	B.C.	12.2	40.2	27.6	
Extraction of impactions	Wa.	45.2	50.3	4.5	3.00
	B.C.	37.8	53.7	8.5	
TMJ problem management	Wa.	5.1	36.0	58.9	9.41 *
	B.C.	11.0	47.6	41.5	
Hospital restorative dentistry	Wa.	1.6	18.4	80.0	49.27 *
	B.C.	14.8	39.5	45.7	
Soft tissue biopsy	Wa.	6.4	56.7	36.9	13.23 *
	B.C.	3.7	37.0	59.3	
Apicoectomy	Wa.	9.2	60.2	30.6	11.58 *
	B.C.	2.4	48.8	48.8	
Restorative treatment of the handicapped child	Wa.	2.5	23.8	73.7	2.60
	B.C.	6.1	23.2	70.7	
Complex restorative treatment	Wa.	54.9	39.4	5.7	8.42
	B.C.	43.9	41.5	14.6	
Treatment of extremely resorbed edentulous ridges	Wa.	12.2	52.2	35.6	4.91
	B.C.	11.0	40.2	48.8	

* Statistically significant at $p \leq .01$.

TABLE 26

QUESTION C - COMPETENCY

Dental Procedures	School	Response Percentage			Chi-Square
		Competent	Reluctant to Undertake	Would Not Undertake	$p \leq .01$ df=2 $X^2=9.21$
Posterior endodontics	Wa.	88.9	10.8	0.3	4.54
	B.C.	80.5	18.3	1.2	
Periodontal osseous surgery	Wa.	21.0	55.1	23.9	27.44 *
	B.C.	12.2	34.1	53.7	
Full-mouth reconstruction	Wa.	32.8	53.2	14.0	20.30 *
	B.C.	20.7	43.9	35.4	
Extraction of impactions	Wa.	38.2	40.8	21.0	.49
	B.C.	34.1	42.7	23.2	
TMJ problem management	Wa.	18.5	57.0	24.5	11.42 *
	B.C.	32.9	37.8	29.3	
Hospital restorative dentistry	Wa.	23.2	38.5	38.2	62.70 *
	B.C.	68.3	23.2	8.5	
Soft tissue biopsy	Wa.	69.4	25.8	4.8	2.34
	B.C.	61.0	34.1	4.9	
Apicoectomy	Wa.	83.1	12.7	4.1	18.77 *
	B.C.	61.7	32.1	6.2	
Restorative treatment of the handicapped child	Wa.	45.4	42.5	12.1	4.47
	B.C.	57.5	30.0	12.5	
Complex restorative treatment	Wa.	80.6	18.8	0.6	16.64 *
	B.C.	68.3	24.4	7.3	
Treatment of extremely resorbed edentulous ridges	Wa.	25.0	52.9	22.1	40.14 *
	B.C.	8.5	34.1	57.3	

* Statistically significant at $p \leq .01$.

TABLE 27

QUESTION C - CURRICULUM IMPORTANCE

Dental Procedures	School	Response Percentage			Chi-Square
		Very Important	Not Mandatory	Specialty Item	$p \leq .01$ df=2 $X^2=9.21$
Posterior endodontics	Wa.	88.6	8.9	2.5	2.89
	B.C.	81.7	13.4	4.9	
Periodontal osseous surgery	Wa.	40.1	32.2	27.7	10.79 *
	B.C.	22.2	34.6	43.2	
Full-mouth reconstruction	Wa.	28.3	44.6	27.1	12.66 *
	B.C.	29.3	25.6	45.1	
Extraction of impactions	Wa.	30.3	44.9	24.8	1.91
	B.C.	38.3	39.5	22.2	
TMJ problem management	Wa.	33.4	34.4	32.2	5.16
	B.C.	46.9	25.9	27.2	
Hospital restorative dentistry	Wa.	10.8	55.7	33.4	44.22 *
	B.C.	36.6	57.3	6.1	
Soft tissue biopsy	Wa.	76.0	18.2	5.8	1.50
	B.C.	78.0	19.5	2.4	
Apiocoectomy	Wa.	68.8	27.1	4.1	4.89
	B.C.	57.5	33.8	8.8	
Restorative treatment of the handicapped child	Wa.	31.1	43.2	25.7	6.10
	B.C.	45.7	34.6	19.8	
Complex restorative treatment	Wa.	83.2	12.4	4.4	4.53
	B.C.	73.2	18.3	8.5	
Treatment of extremely resorbed edentulous ridges	Wa.	31.9	28.1	39.9	9.80 *
	B.C.	15.9	28.0	56.1	

* Statistically significant at $p \leq .01$.

British Columbia, the remaining respondents replying that they would be reluctant to undertake the procedure. In both cases, the item was regarded as an important part of the curriculum.

Periodontics

There was little difference of opinion regarding need for periodontal surgery, approximately 50 percent of both responding groups indicating an occasional need with somewhat divergent opinion among each group between rare and frequent perception of need. Significant difference of opinion relative to the ability to treat the condition existed between the two groups but the majority of each group did not feel competent. Considerable divergence of opinion existed between the graduates of the two schools relative to curriculum importance, the Washington graduates stressing the importance of this area, the British Columbia graduates more inclined to consider such activities as specialty items.

Oral Surgery

Extraction of impactions: No significant difference was noted among any of the categories. Need was perceived primarily as occasional or frequent. Competency was rated more frequently in the category of reluctant to undertake with somewhat fewer replies in the competent area. Curriculum importance was quite divergent within groups, with nearly equal numbers in each group.

Soft tissue biopsy: A significant difference was noted between the two groups regarding need. Fifty-nine percent of the British Columbia respondents indicated a rare need while 37 percent of the Washington group marked rare. Among the Washington respondents 57 percent rated the service as occasional while the British Columbia group felt less need at 37 percent.

No significant difference was noted regarding competency and curriculum content, the majority of both groups feeling competent and indicating that this was a very important curricular item.

Restorative Dentistry

Full-mouth reconstruction: Both groups were in agreement that this procedure was only an occasional or rare item in practice but a significant difference of opinion was noted relative to competency. Only 33 percent from Washington and 21 percent from British Columbia felt competent, but fewer from Washington felt reluctant to undertake the procedure. A significant difference was noted in regard to curriculum importance as well, with opinion widely scattered within and between groups.

Hospital restorative dentistry: British Columbia graduates were less inclined to consider the need for this service as rare compared to the greater number of Washington graduates in this category. Again, a significant difference in regard to perceived competency was noted with 68 percent of the British Columbia group versus 23 percent of the Washington group considering themselves competent. A significant difference regarding curriculum importance was noted, the Washington respondents regarding the activity as not mandatory or a specialty item. The British Columbia group indicated that this service was not mandatory in the curriculum.

Handicapped child: Both groups regarded this category as rare but considerable agreement seemed to exist relative to competency and need for curricular content. Forty-five percent of Washington respondents and 58 percent from British Columbia felt that they were competent, the majority of the remaining individuals being reluctant to undertake the procedure. Within groups there was considerable disagreement relative to curriculum content.

Complex restorative treatment: No significant difference was found between the two groups regarding patient need, nearly half the respondents feeling that a frequent need existed for this service. A high percentage from both responding groups felt competent in the delivery of this service but a significant difference existed between the two groups. Both groups were in agreement as to the importance of this item, 83 percent from Washington and 73 percent from British Columbia rating this item as very important.

Complex removable prosthodontics: British Columbia graduates saw less need for this service, 48 percent indicated rare need versus 36 percent from Washington. There was no significant difference between groups. A significant difference in competency existed between the two graduate groups, the British Columbia graduate more inclined not to undertake such treatment and more inclined to consider such activity as a specialty item.

Temporomandibular Joint Problem Management

A significant difference was noted in reply to the question of need. A majority of Washington graduates seemed to feel that this service was relatively rare versus more concern by the British Columbia graduate. This trend continued as the respondents rated competency. The majority of Washington graduates felt that they would not or would be reluctant to undertake treatment while a lesser percentage from British Columbia had this attitude. Although no significant difference between groups was noted, considerable difference of opinion seemed to exist within groups regarding curriculum importance.

Time Spent in Clinical Activities

Because of confusion among respondents in the interpretation of question E of the questionnaire, few replied adequately. Due to the lack of completeness of data and the consequent possible misinterpretation of results, this question has been omitted from discussion.

Summary and Major Findings

In addition to the findings specifically related to the research questions posed in this study, several items of supplemental interest were noted:

1. The length of the orthodontic program was uniformly regarded as inadequate among Washington respondents regardless of graduation year. Recent graduates from British Columbia showed somewhat greater satisfaction than earlier graduates.

2. Children and adolescent patients comprised a minority of the practices of most respondents. Among British Columbia respondents, there was a trend toward less satisfaction with the orthodontic curriculum content as the percentage of young patients increased. Among Washington graduates, there was a uniform desire for greater content in orthodontics regardless of the nature of the private practice.

3. Over 90 percent of Washington graduates from rural, semi-urban, and large urban communities were in agreement that the orthodontic program was inadequate. British Columbia replies were not significantly related to population size, the majority feeling that the curriculum content was adequate.

4. From both groups, the trend toward more orthodontic involvement in the future was evident. Continuing education courses were desired by both groups, Washington graduates more inclined to seek clinical treatment information. The typical British Columbia graduate was primarily interested in diagnostic information and minor tooth movement knowledge while the Washington practitioner was concerned about comprehensive and compromise treatment procedures.

5. In the majority of cases both groups were very interested in orthodontic continuing education regardless of graduation year or opinion of their undergraduate education.

6. Both groups were interested in knowledge relative to compromise care as an alternative to complete orthodontic treatment.

7. In general, both groups were more satisfied with the care of patients in their own office than the usual level of care nationally or in their community.

CHAPTER VI

SUMMARY, MAJOR FINDINGS, RECOMMENDATIONS AND IMPLICATIONS FOR FURTHER STUDY

The intent of this chapter was to summarize the purpose, design and procedures of the study, to state the major findings and recommendations which were derived from the analysis of the data, and to discuss implications for further study.

Summary of Purposes, Design and Procedures

Purpose and Rationale for the Study

The purpose of this study was to provide data of value in modifying dental school curricular content so as to better meet the needs of dental practice. The study was specifically oriented toward providing information of value in upgrading the predoctoral orthodontic program at the University of Washington.

Three research questions were posed in order to determine an empirical basis for the education of dental practitioners:

1. What is the degree of discrepancy between the perceived role of the general practitioner regarding orthodontics and his ability to fulfill this role based on his dental education?
2. What are the areas of strength and weakness in dental education?
3. What effect does the amount of orthodontic curriculum content have on the effectiveness and attitude of the dental graduate?

It was predicted that a graduate who had received a dental education in balance with the realities of modern dental practice would be effective in the performance and delivery of care, would have a positive attitude toward dental education, and would pursue practice goals in harmony with societies' needs. It was further predicted that comprehensive orthodontic training would result in an effective practitioner possessing a positive attitude toward his orthodontic education and a cooperative attitude with orthodontic specialists.

Design and Procedures

Two research methods, a survey questionnaire and a personal interview, were developed to obtain data regarding the research questions.

Survey questionnaire: In order to obtain information as to the personal, educational, professional and attitudinal variables, a survey instrument was developed. Dental graduates of 1968 to 1973 from the University of British Columbia and the University of Washington who were in general dental practice were selected to receive the written questionnaire. These groups were chosen as representative of those receiving the extremes of orthodontic curricular content, the British Columbia group having received over seven times as much instruction time as the Washington group. Of 432 University of Washington graduates surveyed, 335 responded, 15 were not located and 2 were omitted because of deficiencies in completion of the questionnaire for an 80 percent response rate. Of 105 University of British Columbia graduates, 86 responded, 5 could not be located and 2 were omitted because of deficiencies for an 84 percent response rate. Of the respondents, 315 from Washington and 82 from British Columbia were general practitioners. Questionnaires received were then key punched for data processing.

Frequency counts and percentage responses were computed for each section of the survey questionnaire. Nonparametric statistics were utilized to examine differences between groups. Discriminate analysis was employed with several questions to rank order those factors which most differentiated between British Columbia and Washington Respondents. Cross tabulations were computed between answers in several different sections of the questionnaire with correlational statistics used for comparisons.

Personal Interview: Of those individuals who responded to the questionnaire, a random sample of 15 graduates from the University of British Columbia and 20 from the University of Washington who practiced in either Seattle, Washington, Vancouver, British Columbia, or the surburban communities of these cities were selected to participate in an in-depth personal interview. Data obtained was analyzed for general trends and themes as well as for deviation from the general consensus.

Analysis of Major Findings

Major findings were presented with respect to the research questions posed in Chapter I. Additional findings resulting from the questionnaire and interview were indicated.

Findings Relative to the Research Questions

1. Perceived role of the general practitioner regarding orthodontics versus the ability to fulfill these roles based on the dental education received:

The major role of the general practitioner regarding orthodontics was perceived by the British Columbia dentist as one of early recognition and diagnosis of malocclusion, not necessarily one of treatment. The Washington graduate was more inclined toward instituting some form of intervention.

No significant difference was noted between the perception of patient need for certain orthodontic services among Washington and British Columbia respondents to the questionnaire. Recognition of patient need for all types of orthodontic services was considerably greater among British Columbia graduates. Washington graduates were less confident in their perception of personal competence to perform certain orthodontic activities but were more inclined to become involved in extensive treatment procedures than the British Columbia group.

2. Differences between views of strengths and weaknesses of dental school education:

Washington graduates indicated that the areas of greatest inadequacy of curricular content were in Orthodontics, Oral Surgery, Diagnosis, Periodontics and Community Dentistry while Removable Prosthetics received an inordinate amount of time. Restorative Dentistry, Endodontics, Pedodontics and Prosthodontics were areas of greatest strength. British Columbia graduates noted that inadequate content was offered in the areas of Prosthetics and Crown and Bridge while subjects of greatest strength were Operative Dentistry, Endodontics, Diagnosis and Community Dentistry.

Statistical analysis demonstrated that Orthodontics was the area of greatest difference between groups with the Washington program much less satisfactory. British Columbia graduates generally were content with the content of the predoctoral orthodontic program while the Washington graduates were almost unanimously dissatisfied.

3. Differences in orthodontic curriculum content relative to effectiveness and attitude:

As expected, because of the greater amount of curriculum content received in orthodontics, the British Columbia graduates recognized a much greater incidence of orthodontic difficulties than the Washington graduates.

British Columbia graduates were more actively involved in recognition, diagnosis and timely referral of patients than the Washington respondents while the latter were more involved with treatment of complex orthodontic problems.

Although both groups regarded orthodontic education as an important element of undergraduate dental education, the British Columbia graduates were more content with the program received in dental school than the Washington graduates.

There was no significant difference between Washington and British Columbia respondents regarding satisfaction with orthodontic specialty care, both groups indicating general approval of the quality of treatment. Among both groups there was concern with the level of oral hygiene during orthodontic treatment and concern with the orthodontists' lack of interest in partial treatment. In addition, a trend toward dissatisfaction with the orthodontic profession was noted among Washington general practitioners, several feeling that the specialty was consciously holding back information.

Analysis of Supplemental Findings

Several items of interest not directly related to the research questions were noted.

The orthodontic program was generally regarded as inadequate by Washington respondents regardless of graduation year or population of the practice locale. British Columbia graduates were more satisfied regardless of the population of the community but a trend was evident toward greater satisfaction among more recent graduates.

Children and adolescent patients comprised a minority of the practices of most respondents. Among British Columbia practitioners, there was a

slight trend toward less satisfaction with the orthodontic curriculum content as the percentage of young patients increased. Among Washington graduates, there was uniform desire for greater time in orthodontics regardless of the nature of the private practice.

In the majority of cases, both groups were very interested in orthodontic continuing education regardless of graduation year or opinion of their undergraduate orthodontic education. Both groups would have preferred greater clinic involvement in the undergraduate orthodontic program especially involving minor tooth movement procedures. Both Washington and British Columbia respondents were interested in knowledge relative to compromise care as an alternative to complete orthodontic treatment. Greater interest was expressed by British Columbia respondents for diagnostic information while technical treatment information was the principal desire of Washington graduates.

Recommendations

Based on these findings and the related literature, the following recommendations are proposed regarding policy, departmental organization and curricular content relative to orthodontic education for the general practitioner:

1. Dental school curriculum planning organizations should appraise the views of graduate dentists prior to designing or redesigning curricula.

2. It is recommended that the American Association of Orthodontists, (A.A.O.), the Council on Orthodontic Education of the A.A.O. and the Council on Dental Education of the American Dental Association play an active role in the development of guidelines for predoctoral programs and postdoctoral orthodontic continuing education courses. Guidelines as to the scope of general

practitioner involvement in areas of orthodontics and pedodontics should be established as well as minimal levels of competency appropriate for general practice.

3. The University of Washington Department of Orthodontics should actively pursue avenues for revising and upgrading the undergraduate orthodontic curriculum so as to provide the dental student with the necessary orthodontic background to meet the needs of general dental practice.

4. Consideration should be given to the establishment of a separate department within the University of Washington School of Dentistry, tentatively labeled the Department of Pediatric Dentistry, the objective of which would be to develop and implement a curriculum concerned with the comprehensive dental care of the child and adolescent (Appendix H).

5. Orthodontic continuing education should be restructured to actively involve the faculty of the University of Washington. It is recommended that a series of continuing education courses be established following the format and intent of the predoctoral program recommended in this paper. The intent would be to raise the level of knowledge of the practicing dentist to the criterion performance level of the undergraduate student. It would further be desirable to provide continuing education courses relevant to pre-restorative minor tooth movement activities.

Implications for Further Study

A study of this type hopefully raises more questions than it answers and provokes additional studies which will probe deeply into more narrow subject areas. The following appear to the investigator as subjects particularly worthy of further examination:

1. Curriculum appropriate for clinical disciplines in dentistry could be improved by the use of survey techniques to assess the attitudes and opinions of graduate dentists, specialists and the general public. Curriculum committees would then have objective data for decision making to add to the subjective opinion and experience of the committee members.

2. Data relative to the public need and demand for orthodontic care would be useful in planning the supply of orthodontic specialists and the competency level necessary in predoctoral dental education.

3. Continuing education for the general practitioner should be studied from the view of the practitioners' desire and need for advanced training, the competency level of practitioners interested in continuing education, and the effectiveness of various teaching strategies.

4. Methods of quantifying competency in orthodontic cognitive knowledge and manipulative skill should be developed.

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APPENDICES

APPENDIX A

DENTAL CURRICULA

UNIVERSITY OF BRITISH COLUMBIA

UNIVERSITY OF WASHINGTON

APPENDIX A

TABLE 28

DENTAL SCHOOL ADMISSIONS CRITERIA

	University of British Columbia	University of Washington
Attributes Evaluated	Academic Ability Predental Scholastic Record Aptitude Tests Letters of Recommendation Personal Interview (optional)	Academic Ability Predental Scholastic Record Aptitude Tests Letters of Recommendation Personal Interview (optional) Autobiographical Resume'
Predental Requirements	Equivalent of Three Academic Years	Equivalent of Three Academic Years
Minimal Predental Courses	English Mathematics General Chemistry Organic Chemistry Inorganic Chemistry Physics Biology	General Chemistry Organic Chemistry Physics Zoology Embryology Biochemistry Microbiology
Minimal Scholastic Average	65th Percentile	None Stated
Aptitude Test	Canadian Dental Association Dental Aptitude Test or American Dental Association Dental Aptitude Test	American Dental Association Dental Aptitude Test

APPENDIX A

TABLE 29

CURRENT DENTAL CURRICULA (1973 Graduate)

(Credit Hours)

	Univ. of British Columbia	Univ. of Washington
Anatomy (Gross)	6	6
Anatomy (Dental)	6	8
Anatomy (Neuro)	2	2
Biochemistry	7	6
Biomaterials	4	4
Community Health	8	5
Diagnosis	8	13
Embryology	0	2
Growth & Development	12	0
Histology	0	6
History of Dentistry	1	1
Microbiology	6	7
Occlusion	5	0
Oral Medicine (Oral Biology)	13	1
Oral Surgery	15	15
Orthodontics	13	2
Pathology	20	13
Periodontics	15	11
Pharmacology	3	3
Physiology	7	7
Restorative Dentistry	112	127
Operative Dentistry		38
Prosthetics		40
Endodontics		8
Pedodontics		10
Fixed Partial Dentures		31
TOTAL	263	239

APPENDIX B

ORTHODONTIC CURRICULA

UNIVERSITY OF BRITISH COLUMBIA

UNIVERSITY OF WASHINGTON

APPENDIX B

TABLE 30

ORTHODONTIC CURRICULUM CLOCK HOURS

Graduation year	School	Lecture	Lab	Seminar	Observation	Clinic	Total
1973	Wa.	20		10	2		32
	B.C.	60	55	12		52	179
1972	Wa.	10		10	2		22
	B.C.	60	62	12		55	189
1971	Wa.	30		10	2		42
	B.C.	54	60	11		57	182
1970	Wa.	30		10	2		42
	B.C.	37	55	11		55	160
1969	Wa.	30		10	2		42
	B.C.	37	54	11		56	158
1968	Wa.	30		10	2		42
	B.C.	38	52	11		55	156

APPENDIX C

DENTAL ACTIVITY AND ATTITUDE QUESTIONNAIRE

A. How do you view the following possible developments in dentistry? (On a scale from generally favorable to generally unfavorable, mark one box per line which represents your attitude on each item.)

	Generally Favorable				Generally Unfavorable
	1	2	3	4	5
National health insurance	[ ]	[ ]	[ ]	[ ]	[ ]
Three year dental curriculum (Same curriculum with no summer vacations)	[ ]	[ ]	[ ]	[ ]	[ ]
Three year dental curriculum (Reduced curriculum with summer vacations)	[ ]	[ ]	[ ]	[ ]	[ ]
Auxiliaries restoring teeth (placing restorations)	[ ]	[ ]	[ ]	[ ]	[ ]
Dentist supervised treatment team	[ ]	[ ]	[ ]	[ ]	[ ]
Mandatory relicensure (clinical & written)	[ ]	[ ]	[ ]	[ ]	[ ]
Specialty board examinations	[ ]	[ ]	[ ]	[ ]	[ ]
Regional national reciprocity	[ ]	[ ]	[ ]	[ ]	[ ]
Regional international reciprocity (Wa. - B.C.)	[ ]	[ ]	[ ]	[ ]	[ ]
General practitioners allowed to practice all phases of dentistry	[ ]	[ ]	[ ]	[ ]	[ ]
Specialists allowed to practice all phases of dentistry	[ ]	[ ]	[ ]	[ ]	[ ]
Specialty certification required to receive third party payment for specialty service	[ ]	[ ]	[ ]	[ ]	[ ]

B. How does the amount of dental school curriculum time that you spent in each of the following disciplines compare with the needs of your practice? (Mark one box per line.)

	Too Much	About Right	Too Little
Community Dentistry	[ ]	[ ]	[ ]
Crown and Bridge (F.P.D.)	[ ]	[ ]	[ ]
Diagnosis	[ ]	[ ]	[ ]
Endodontics	[ ]	[ ]	[ ]
Operative Dentistry (Single restorations)	[ ]	[ ]	[ ]
Oral Surgery	[ ]	[ ]	[ ]
Orthodontics	[ ]	[ ]	[ ]
Pedodontics	[ ]	[ ]	[ ]
Periodontics	[ ]	[ ]	[ ]
Removable Prosthodontics	[ ]	[ ]	[ ]

C. In your practice,

a. Rate your patients' NEED

b. Rate your COMPETENCY in providing the care

c. Rate your estimate of the degree of IMPORTANCE that <u>should</u> be placed on each listed area within an ideal general dental curriculum.

(Mark 1, 2 or 3 in each box.)

	NEED	COMPETENCY	CURRICULUM IMPORTANCE
	1. Frequent	1. Competent	1. Very Important
	2. Occasional	2. Reluctant to undertake	2. Not Mandatory
	3. Rare	3. Would not undertake	3. Specialty Item
Posterior endodontics	[ ]	[ ]	[ ]
Periodontal osseous surgery	[ ]	[ ]	[ ]
Full-mouth reconstruction	[ ]	[ ]	[ ]
Extraction of impactions (hard tissue)	[ ]	[ ]	[ ]
Serial extraction (deciduous & permanent teeth)	[ ]	[ ]	[ ]
TMJ problem management	[ ]	[ ]	[ ]
Multibanded orthodontics	[ ]	[ ]	[ ]
Hospital restorative dentistry	[ ]	[ ]	[ ]
Soft tissue biopsy	[ ]	[ ]	[ ]
Limited tooth movement (removable appliances)	[ ]	[ ]	[ ]
Limited tooth movement (limited banding, headgear, etc.)	[ ]	[ ]	[ ]
Habit correction (removable or fixed appliance)	[ ]	[ ]	[ ]
Apicoectomy	[ ]	[ ]	[ ]
Restorative treatment of the mentally or physically handicapped child	[ ]	[ ]	[ ]
Complex restorative treatment	[ ]	[ ]	[ ]
Treatment of extremely resorbed edentulous ridges	[ ]	[ ]	[ ]

D. How would you rate your personal satisfaction regarding the following? (On a scale from generally satisfied to generally dissatisfied, mark one box per line which represents your attitude on each item.)

	Generally Satisfied				Generally Dissatisfied
	1	2	3	4	5
Your dental school education	[ ]	[ ]	[ ]	[ ]	[ ]
National dental care	[ ]	[ ]	[ ]	[ ]	[ ]
Dental care in your community	[ ]	[ ]	[ ]	[ ]	[ ]
Dental care in your practice	[ ]	[ ]	[ ]	[ ]	[ ]
Care of your children patients	[ ]	[ ]	[ ]	[ ]	[ ]
Care of your adult patients	[ ]	[ ]	[ ]	[ ]	[ ]
Care by dental specialists	[ ]	[ ]	[ ]	[ ]	[ ]
Specialist - general practitioner cooperation & communication					
Oral Surgeons	[ ]	[ ]	[ ]	[ ]	[ ]
Orthodontists	[ ]	[ ]	[ ]	[ ]	[ ]
Periodontists	[ ]	[ ]	[ ]	[ ]	[ ]
Pedodontists	[ ]	[ ]	[ ]	[ ]	[ ]
Endodontists	[ ]	[ ]	[ ]	[ ]	[ ]

E. What percentage of your practice time do you spend in each of the following areas and what percentage should be spent by the properly trained general practitioner in the future? (Mark 1, 2, 3, 4 or 5 in each box.)

1: under 10%
2: 10 - 20%
3: 20 - 30%
4: 30 - 40%
5: over 40%

	Present %	Ideal %
Crown and Bridge (F.P.D.)	[ ]	[ ]
Endodontics	[ ]	[ ]
Operative Dentistry	[ ]	[ ]
Oral Surgery	[ ]	[ ]
Orthodontics	[ ]	[ ]
Periodontics (excluding prophylaxes)	[ ]	[ ]
Prevention	[ ]	[ ]
Removable Prosthodontics	[ ]	[ ]
Other (specify)_____	[ ]	[ ]

F. How interested would you be in continuing education courses in the following areas? (On a scale from very interested to not interested, mark one box per line which represents your attitude on each item.)

	Very Interested 1	2	3	4	Not Interested 5
Community Dentistry	[ ]	[ ]	[ ]	[ ]	[ ]
Crown & Bridge (F.P.D.)	[ ]	[ ]	[ ]	[ ]	[ ]
Diagnosis	[ ]	[ ]	[ ]	[ ]	[ ]
Endodontics	[ ]	[ ]	[ ]	[ ]	[ ]
Operative Dentistry (single restorations)	[ ]	[ ]	[ ]	[ ]	[ ]
Oral Surgery	[ ]	[ ]	[ ]	[ ]	[ ]
Orthodontics	[ ]	[ ]	[ ]	[ ]	[ ]
Pedodontics	[ ]	[ ]	[ ]	[ ]	[ ]
Personal & Practice Finances	[ ]	[ ]	[ ]	[ ]	[ ]
Practice Management	[ ]	[ ]	[ ]	[ ]	[ ]
Preventive Dentistry	[ ]	[ ]	[ ]	[ ]	[ ]
Removable Prosthodontics	[ ]	[ ]	[ ]	[ ]	[ ]

G. What was your year of graduation from dental school?

[ ] '73 [ ] '72 [ ] '71 [ ] '70 [ ] '69 [ ] '68

H. What year did you begin general practice?

[ ] '74 [ ] '73 [ ] '72 [ ] '71 [ ] '70 [ ] '69 [ ] '68

I. What percentage of your practice is:

under age 12?	[ ] under 20%	[ ] 20 - 40%	[ ] 40 - 60%	[ ] 60 - 80%	[ ] over 80%
age 12 to 18?	[ ] "	[ ] "	[ ] "	[ ] "	[ ] "
over age 18?	[ ] "	[ ] "	[ ] "	[ ] "	[ ] "

J. What is the population of your local community?

[ ] under 5,000
[ ] 5,000 - 10,000
[ ] 10,000 - 25,000
[ ] 25,000 - 100,000
[ ] over 100,000

APPENDIX D

PERSONAL INTERVIEW FORMAT

Personal Interview

A. ASSESSMENT OF PRACTICE

1. Are you presently doing any orthodontics? If no, why not?

   a. serial extraction
   b. removable appliances
   c. limited banding
   d. habit appliances
   e. headgear
   f. fixed appliances
   g. ectopic eruption
   h. palatal expansion
   i. other

2. Why do you do orthodontics? (rate importance of the following)

   a. enjoy doing orthodontics
   b. legitimate G.P. activity
   c. parents can't afford full orthodontic treatment
   d. increase income
   e. other

3. Have you considered doing less? Why?

4. Would you prefer to do more orthodontics? Why?

5. What types of cases are easiest for you to handle?

   a. serial extraction
   b. minor tooth movement
   c. palatal expansion
   d. other

6. What types of cases are hardest for you to handle?

   a. banded appliances
   b. skeletal malocclusion
   c. minor tooth movement
   d. other

B. DENTAL SCHOOL ORTHODONTIC EDUCATION

1. Relative to your practice needs, how would you characterize your dental school orthodontic education?

2. What areas needed greater emphasis?

3. What areas received too much emphasis?

4. What orthodontic procedures should you as a general practitioner be able to handle?

a. serial extraction
b. removable appliances
c. limited banding
d. habit appliances
e. headgear
f. fixed appliances
g. ectopic eruption
h. palatal expansion
i. other

5. Could some of the dental curriculum be reduced to make room for increased orthodontic training? Which areas?

6. Could some of dental education be better handled by an individualized self-instructional approach? Which areas?

7. Where should the major orthodontic education be given - as post-graduate continuing education or during the regular dental school training period?

8. What about a pathway approach in dental school with a student somewhat free to pursue certain areas in greater detail, such as periodontics, while reducing another area such as endodontics?

9. Are you familiar with any dental schools that are more effective than yours in providing orthodontic instruction for dental students?

C. ORTHODONTIC REFERRALS

1. How much need is there for orthodontics among your children and adolescent patients?

   a. less than 25%
   b. 25 - 50%
   c. greater than 50%

2. Do you refer patients to orthodontists? If not, why?

3. Are you satisfied with the quality of orthodontic care by the specialists in your community?

4. Do you think that there are sufficient numbers of orthodontists in your area to serve the patients referred by general practitioners?
   Are there too many?

5. What are the fees charged by orthodontists in your area for a typical full treatment 1 - 1 1/2 year case?

6. Do orthodontists ever charge less?

7. Do you think that the fees are fair?

8. Are they in keeping with other fees for dentistry?

9. Are most who need treatment receiving orthodontic care?

   If not, why arn't more patients being treated orthodontically?

   a. lack of orthodontists
   b. cost
   c. G.P.'s not referring
   d. low patient understanding
   e. other

10. Do you assess every case as to the need for orthodontics?

11. Assuming that finances are related to whether a child will be treated, what percentage of your patients who need care would benefit from "compromise care" provided by either you or the orthodontist?

    a. less than 25%
    b. 25 - 50%
    c. greater than 50%

D. ATTITUDES

1. What would you say is the general practitioner's biggest complaint about orthodontists or orthodontics in general?

2. Are there communication problems between the orthodontist and yourself?

   What should you and the orthodontist be doing differently?

3. What is the major concern or complaint of parents regarding orthodontics?

E. THE FUTURE

1. Do you presently have a preventive dentistry program?
   a. Do you think it is successful?
   b. Can you see a change in attitude or performance?
   c. Financially, can prevention pay its way for the practitioner?

2. What do you feel is the eventual character of your practice? How will you and your staff be spending your time differently?

3. Do you think the emphasis in your practice will shift toward more orthodontics, periodontics or other so called specialty areas?

4. What steps are you taking to prepare yourself?

5. What should the schools be doing to help?

F. CONTINUING EDUCATION

1. Are there roadblocks to your gaining additional orthodontic information? What are they?

2. Have you pursued continuing education courses in orthodontics?

   To what degree were they of benefit?

   How could they have been more beneficial?

3. Are you interested in taking more courses in orthodontics?

4. What kinds of courses would be desirable?
   a. diagnosis
   b. treatment planning
   c. mechanics

5. What is the best way to conduct continuing education?
   a. university
   b. community college
   c. audiovisual tapes
   d. written booklets
   e. T.V.
   f. combinations of the above
   g. other

6. How much time would you be willing to devote to an orthodontic course or courses?

APPENDIX E

QUESTIONNAIRE COVER LETTERS

UNIVERSITY OF WASHINGTON
SEATTLE, WASHINGTON 98105

February 22, 1974

School of Dentistry
Office of Associate Dean

Dear Colleague:

Your dental school is currently undergoing a critical self-analysis in an attempt to design a dental curriculum in tune with the needs of our patients and profession. An often neglected source of curricular input is the dental graduate, the practitioner who daily experiences the realities of patient care and practice management. Your views are important and will be of great value in building an effective curriculum.

Enclosed is a simple questionnaire designed to evaluate your opinion on current controversial issues. Graduates from 1968 to 1973 are being surveyed. As you may know, this is the period of greatest change in the general dental curriculum. It is our objective to ascertain what effect these changes have had on the attitudes and mode of practice of Washington graduates. Your cooperation and participation in responding to this survey will be appreciated.

The University and School of Dentistry assures you that this identifying cover letter will be removed from the questionnaire before recording your responses. Your name, location and nature of practice will be used to tabulate responses, geographic location and type of practice. To make this study more meaningful and to achieve a maximum return rate, names will be used to determine non-respondents who will then be sent a follow-up questionnaire. Insuring your freedom from identification is of prime concern, not only to respect privacy but to remove any inhibition to free and open comment.

Thank you for your assistance.

Robert M. Little Alton W. Moore

Robert M. Little, D.D.S.
Project Coordinator

Alton W. Moore, D.D.S.
Associate Dean for Curriculum

PLEASE print your name _____

indicate your practice address _____

_____

check one: General practitioner ( )
Specialist ( )

Specify specialty _____

THE UNIVERSITY OF BRITISH COLUMBIA
VANCOUVER 8, CANADA

FACULTY OF DENTISTRY
DEPARTMENT OF ORTHODONTICS

March 7, 1974.

Dear Colleague:

In collaboration with the University of Washington School of Dentistry, the Orthodontic Department at U.B.C. is endeavouring to assess the practical value of its courses in the light of the experience of recent graduates who are now established in practice.

Enclosed is a questionnaire which we sincerely hope you will give a few minutes of your time to complete. As you will see, some of the questions do not *directly* relate to orthodontics per se. However, we feel that if we are to improve the orthodontic course, we must be aware of your feelings as to the significance of orthodontics as related to the other disciplines in dentistry. Additionally, we would like to know your feelings on some other practice-related questions, such as mandatory relicensure etc.

We know that questionnaires can be an irritation, and we know that this is the second request of this nature you have received recently. However we do ask your cooperation - our motives are simply to try to improve orthodontic curricula at both the Washington and B.C. schools.

In order to prevent sending you unnecessary follow-up requests, kindly fill in your name and address at the foot of this page and enclose it with the questionnaire in the self-addressed stamped envelope.

Your name and address will be removed immediately the envelope is opened, and no correlation will be made between your responses and your identity. This will be done to respect your privacy and to remove any inhibition to free and open comment.

Thank you in advance for your cooperation,
Sincerely yours,

Robert M. Little, M.S.D., D.D.S.
Project Coordinator
Department of Orthodontics
University of Washington

Clement S.C. Lear, B.D.S., D.M.D.
Professor and Head
Department of Orthodontics
University of British Columbia

PLEASE print your name _____

indicate your address _____

_____

check one: General practitioner ( )
Specialist ( )

Specify specialty _____

APPENDIX F

QUESTIONNAIRE FOLLOW-UP LETTERS

UNIVERSITY OF WASHINGTON
SEATTLE, WASHINGTON 98105

March 4, 1974

School of Dentistry
Office of Associate Dean

Dear Colleague:

A few weeks ago we mailed you a questionnaire regarding your dental school education and subsequent practice. At the present time we have not received your completed form.

We feel that your check list will be of great importance in redesigning the dental curriculum at the University of Washington. It is our hope that a high response rate will demonstrate the interest of recent graduates in influencing the direction of dental education.

We urge you to participate in the curriculum planning by completing the enclosed questionnaire. Again, feel assured that your privacy will be respected, your name merely used to confirm your response. From our list of respondents, we plan to randomly select a small number of individuals who will be asked to participate at their convenience in a personal interview.

Gratefully,

Robert M. Little, D.D.S.
Project Coordinator

Alton W. Moore, D.D.S.
Associate Dean for Curriculum

PLEASE Print your name _____

indicate your practice address _____

_____

check one: General practitioner ( )
Specialist ( )

Specify specialty _____

THE UNIVERSITY OF BRITISH COLUMBIA
VANCOUVER 8, CANADA

FACULTY OF DENTISTRY
DEPARTMENT OF ORTHODONTICS

Dear Colleague:

A few weeks ago we mailed you a questionnaire regarding your dental school education and subsequent practice. At the present time we have not received your completed form.

We feel sure that your check list will be of great importance in influencing the orthodontic curriculum at the University of British Columbia and the University of Washington. It is our hope that a high response rate will demonstrate the interest of recent graduates in influencing the direction of orthodontic education.

We urge you to participate in the curriculum planning by completing the enclosed questionnaire. Again, feel assured that your privacy will be respected, your name being used solely to prevent further requests being sent to you.

Gratefully,

Robert M. Little, M.S.D., D.D.S.
Project Coordinator
Department of Orthodontics
University of Washington

Clement S.C. Lear, B.D.S., D.M.D.
Professor and Head
Department of Orthodontics
University of British Columbia

PLEASE print your name _____

indicate your practice address _____

_____

check one: General practitioner ( )
Specialist ( )

Specify specialty _____

APPENDIX G

TABLES SHOWING DEMOGRAPHIC AND OPINIONAIRE RESULTS OF THE SURVEY

APPENDIX C

TABLE 31

QUESTION A - POSSIBLE DEVELOPMENTS IN DENTISTRY

Current Issues	School	Response Frequency					Total
		Favorable			Unfavorable		
		1	2	3	4	5	
National health insurance	Wa.	54	74	74	50	58	310
	B.C.	15	21	20	6	18	80
Three year dental curriculum (No summer vacations)	Wa.	33	40	66	77	98	314
	B.C.	11	9	12	13	36	81
Three year dental curriculum (With summer vacations)	Wa.	10	14	19	61	208	312
	B.C.	7	5	5	14	48	79
Auxiliaries restoring teeth	Wa.	79	96	60	42	38	315
	B.C.	23	22	18	6	12	81
Dentist supervised treatment team	Wa.	117	99	56	28	14	314
	B.C.	34	29	11	2	4	80
Mandatory relicensure	Wa.	26	36	69	70	110	311
	B.C.	21	19	17	9	15	81
Specialty board examinations	Wa.	113	89	70	18	21	311
	B.C.	32	26	16	2	4	80
Regional national reciprocity	Wa.	144	67	27	19	54	311
	B.C.	42	16	14	1	5	78
Regional international reciprocity	Wa.	91	45	54	40	84	314
	B.C.	34	11	14	3	13	75
G.P. allowed to practice all phases of dentistry	Wa.	212	67	26	7	3	315
	B.C.	66	8	5	1	1	81
Specialists allowed to practice all phases of dentistry	Wa.	120	55	49	39	52	315
	B.C.	41	13	8	5	14	81
Specialty certification required to receive third party payment	Wa.	33	27	59	44	139	302
	B.C.	15	8	17	6	31	77

APPENDIX G - CONTINUED

TABLE 32

QUESTION B - CURRICULUM TIME

Clinical Discipline	School	Response Frequency			Total
		Too Much	About Right	Too Little	
Community Dentistry	Wa.	48	147	114	309
	B.C.	9	60	9	78
Crown & Bridge	Wa.	5	262	46	313
	B.C.	3	45	34	82
Diagnosis	Wa.	4	125	185	314
	B.C.	2	64	16	82
Endodontics	Wa.	2	284	28	314
	B.C.	4	71	6	81
Operative Dentistry	Wa.	60	246	9	315
	B.C.	6	73	3	82
Oral Surgery	Wa.	6	88	221	315
	B.C.	1	53	28	82
Orthodontics	Wa.	2	17	292	311
	B.C.	2	48	32	82
Pedodontics	Wa.	4	277	31	312
	B.C.	11	55	16	82
Periodontics	Wa.	18	174	122	314
	B.C.	13	48	21	82
Removable Pros.	Wa.	74	213	26	313
	B.C.	5	24	53	82

APPENDIX G - CONTINUED

TABLE 33

QUESTION C - PATIENT'S NEED

Dental Procedure	School	Response Frequency			Total
		Frequent	Occasional	Rare	
Posterior endodontics	Wa.	243	69	3	315
	B.C.	49	31	2	82
Periodontal osseous surgery	Wa.	86	179	49	314
	B.C.	15	44	23	82
Full-mouth reconstruction	Wa.	27	137	150	314
	B.C.	10	33	39	82
Extraction of impactions (hard tissue)	Wa.	142	158	14	314
	B.C.	31	44	7	82
Serial extraction (deciduous & permanent)	Wa.	101	148	65	314
	B.C.	25	46	11	82
TMJ problem management	Wa.	16	113	185	314
	B.C.	9	39	34	82
Multibanded orthodontics	Wa.	116	128	71	315
	B.C.	32	38	12	82
Hospital restorative dentistry	Wa.	5	58	252	315
	B.C.	12	32	37	81
Soft tissue biopsy	Wa.	20	178	116	314
	B.C.	3	30	48	81
Limited tooth movement (removable appliances)	Wa.	116	174	24	314
	B.C.	30	47	5	82
Limited tooth movement (limited headgear, banding)	Wa.	100	161	53	314
	B.C.	21	53	8	82
Habit correction	Wa.	37	160	115	312
	B.C.	9	45	28	82
Apicoectomy	Wa.	29	189	96	314
	B.C.	2	40	40	82
Restorative treatment of the handicapped child	Wa.	8	75	232	315
	B.C.	5	19	58	82
Complex restorative treatment	Wa.	173	124	18	315
	B.C.	36	34	12	82
Treatment of extremely resorbed edentulous ridges	Wa.	38	163	111	312
	B.C.	9	33	40	82

APPENDIX G - CONTINUED

TABLE 34

QUESTION C - COMPETENCY

Dental Procedure	School	Response Frequency			Total
		Competent	Reluctant to Undertake	Would Not Undertake	
Posterior endodontics	Wa.	280	34	1	315
	B.C.	66	15	1	82
Periodontal osseous surgery	Wa.	66	173	75	314
	B.C.	10	28	44	82
Full-mouth reconstruction	Wa.	103	167	44	314
	B.C.	17	36	29	82
Extractions of impactions (hard tissue)	Wa.	120	128	66	314
	B.C.	28	35	19	82
Serial extraction (decisuous & permanent)	Wa.	151	128	35	314
	B.C.	43	29	10	82
TMJ problem management	Wa.	58	179	77	314
	B.C.	27	31	24	82
Multibanded orthodontics	Wa.	13	37	265	315
	B.C.	3	13	66	82
Hospital restorative dentistry	Wa.	73	121	120	314
	B.C.	56	19	7	82
Soft tissue biopsy	Wa.	218	81	15	314
	B.C.	50	28	4	82
Limited tooth movement (removable appliances)	Wa.	137	154	23	314
	B.C.	55	24	3	82
Limited tooth movement (banding, headgear, etc.)	Wa.	37	135	142	314
	B.C.	23	40	19	82
Habit correction	Wa.	82	163	66	311
	B.C.	43	34	5	82
Apicoectomy	Wa.	261	40	13	314
	B.C.	50	26	5	81
Restorative treatment of the handicapped child	Wa.	143	134	38	315
	B.C.	46	24	10	80
Complex restorative treatment	Wa.	253	59	2	314
	B.C.	56	20	6	82
Treatment of extremely resorbed edentulous ridges	Wa.	78	165	69	312
	B.C.	7	28	47	82

APPENDIX C - CONTINUED

TABLE 35

QUESTION C - CURRICULUM IMPORTANCE

Dental Procedure	School	Response Frequency			Total
		Very Important	Not Mandatory	Specialty Item	
Posterior endodontics	Wa.	279	28	8	315
	B.C.	67	11	4	82
Periodontal osseous surgery	Wa.	126	101	87	314
	B.C.	18	28	35	81
Full-mouth reconstruction	Wa.	89	140	85	314
	B.C.	24	21	37	82
Extraction of impactions (hard tissue)	Wa.	95	141	78	314
	B.C.	31	32	18	81
Serial extraction (deciduous & permanent)	Wa.	213	73	28	314
	B.C.	61	14	7	82
TMJ problem management	Wa.	105	108	101	314
	B.C.	38	21	22	81
Multibanded orthodontics	Wa.	37	65	213	315
	B.C.	11	23	48	82
Hospital restorative dentistry	Wa.	34	175	105	314
	B.C.	30	47	5	82
Soft tissue biopsy	Wa.	238	57	18	313
	B.C.	64	16	2	82
Limited tooth movement (removable appliances)	Wa.	229	67	18	314
	B.C.	69	12	1	82
Limited tooth movement (banding, headgear, etc.)	Wa.	120	87	108	315
	B.C.	49	22	10	81
Habit correction	Wa.	122	125	64	311
	B.C.	59	18	4	81
Apicoectomy	Wa.	216	85	13	314
	B.C.	46	27	7	80
Restorative treatment of the handicapped child	Wa.	98	136	81	315
	B.C.	37	28	16	81
Complex restorative treatment	Wa.	262	39	14	315
	B.C.	60	15	7	82
Treatment of extremely resorbed edentulous ridges	Wa.	100	88	125	313
	B.C.	13	23	46	82

APPENDIX G - CONTINUED

TABLE 36

QUESTION D - PERSONAL SATISFACTION

Issues	School	Response Frequency					Total
		Satisfied				Dissatisfied	
		1	2	3	4	5	
Your dental school education	Wa.	138	134	26	8	8	314
	B.C.	26	39	12	5	0	82
'National dental care	Wa.	4	36	118	104	51	313
	B.C.	2	11	23	28	16	80
Dental care in your community	Wa.	38	108	105	51	11	313
	B.C.	9	20	37	10	5	81
Dental care in your practice	Wa.	128	150	24	8	2	312
	B.C.	29	42	9	1	0	81
Care of your children patients	Wa.	136	119	35	5	3	298
	B.C.	33	36	7	3	0	79
Care of your adult patients	Wa.	138	139	24	9	3	313
	B.C.	30	41	8	0	1	80
Care by dental specialists	Wa.	124	141	33	7	4	309
	B.C.	27	30	15	4	2	78
Specialist - G.P. cooperation & communication							
Oral Surgeons	Wa.	171	89	30	9	3	302
	B.C.	47	16	13	3	1	80
Orthodontists	Wa.	167	73	29	15	9	293
	B.C.	50	19	7	2	2	80
Periodontists	Wa.	128	89	43	19	7	286
	B.C.	38	15	17	3	3	76
Pedodontists	Wa.	113	71	54	8	6	252
	B.C.	29	16	23	1	2	71
Endodontists	Wa.	137	76	41	3	4	261
	B.C.	38	18	14	1	3	74

APPENDIX G - CONTINUED

TABLE 37

QUESTION F - INTEREST IN CONTINUING EDUCATION

Clinical Discipline	School	Response Frequency					Total
		Very Interested				Not Interested	
		1	2	3	4	5	
Community Dentistry	Wa.	37	46	105	66	57	311
	B.C.	8	8	27	22	16	81
Crown & Bridge	Wa.	82	137	66	22	7	314
	B.C.	29	27	18	2	5	81
Diagnosis	Wa.	145	114	47	5	2	313
	B.C.	25	27	23	1	4	80
Endodontics	Wa.	108	121	68	13	5	315
	B.C.	27	30	19	2	4	82
Operative Dentistry (single restorations)	Wa.	37	71	107	63	36	314
	B.C.	17	13	25	19	8	82
Oral Surgery	Wa.	65	91	87	46	25	314
	B.C.	18	25	21	10	8	82
Orthodontics	Wa.	134	87	48	23	22	314
	B.C.	35	27	12	4	4	82
Pedodontics	Wa.	78	99	96	25	16	314
	B.C.	20	16	28	12	6	82
Personal & Practice Finances	Wa.	135	97	60	15	8	315
	B.C.	31	17	12	16	6	82
Practice Management	Wa.	146	98	54	15	2	315
	B.C.	26	24	20	8	4	82
Preventive Dentistry	Wa.	121	107	66	14	5	313
	B.C.	28	28	21	3	2	82
Removable Pros.	Wa.	33	73	105	61	40	312
	B.C.	21	15	17	12	17	82

APPENDIX G - CONTINUED

TABLE 38

QUESTION G - YEAR OF GRADUATION

School	Frequency and Percentage			Total
	1973-72	1971-70	1969-68	
Wa.	115 (36.6)	108 (34.4)	91 (29.0)	314 (100)
B.C.	49 (60.5)	22 (27.2)	10 (12.3)	81 (100)

APPENDIX G - CONTINUED

TABLE 39

QUESTION H - YEAR PRACTICE BEGUN

School	Frequency and Percentage			Total
	1974-72	1971-70	1969-68	
Wa.	176 (57.9)	99 (32.6)	29 (9.5)	304 (100)
B.C.	52 (64.2)	20 (24.7)	9 (11.1)	81 (100)

APPENDIX G - CONTINUED

TABLE 40

QUESTION I - PATIENT AGE

Patient Age	School	Response Frequency					Total
		Under 20%	20-40%	40-60%	60-80%	Over 80%	
Under Age 12	Wa.	136	130	17	3	2	288
	B.C.	26	36	15	2	1	80
Age 12 to 18	Wa.	112	160	18	1	0	291
	B.C.	15	60	5	0	0	80
Over Age 18	Wa.	10	61	114	58	66	309
	B.C.	1	32	31	9	6	79

APPENDIX G - CONTINUED

TABLE 41

QUESTION J - POPULATION OF COMMUNITY

School	Frequency and Percentage			Total
	Under 25,000	25,000 - 100,000	Over 100,000	
Wa.	150 (48.5)	78 (25.2)	81 (26.2)	309 (100)
B.C.	27 (33.3)	24 (29.6)	30 (37.0)	81 (100)

APPENDIX H

CURRICULUM DESIGN STRATEGY

SAMPLE ILLUSTRATION

PEDIATRIC DENTISTRY

Pediatric Dentistry

The purpose of instituting a Department of Pediatric Dentistry would be to facilitate the development of an overall curriculum direction for the comprehensive care of the child and adolescent patient. A multidisciplinary approach is anticipated whereby fields such as anthropology, child growth, speech, nutrition, psychology, oral medicine, pedodontics, restorative dentistry and orthodontics would be involved in an effort to integrate knowledge of the developing child. The end product of such a program would be a practitioner able and competent to comprehensively recognize and diagnose pediatric problems and either treat those conditions under his area of competence or refer the pediatric patient to the appropriate specialist at the most opportune developmental age.

To illustrate the planning involved in designing a program in Pediatric Dentistry, a hypothetical five hour instructional unit involving Pedodontics and Orthodontics is illustrated in the following section. It should be noted that the details of this five hour illustration are tentative and are only offered as an example of how curriculum could be designed. The final recommendations for the establishment of this new department with specifics regarding objectives, courses, electives, organization, budget, space, staff, etc. must be determined through group process involving the Department of Pediatric Dentistry in conjunction with students, educational specialists, faculty of various disciplines, and the administration.

A. Instructional Problem

Roentgenographic cephalometry is a standardized technique of studying the skull by means of an oriented lateral skull x-ray. Cephalometric x-rays have become one of a number of indispensable diagnostic tools available to the orthodontist. The technique was designed as a method of simultaneously recording the relationships between the dentition, jaws, skull and soft tissues of the face. A clinical cephalometric evaluation makes it possible to determine areas of dysplasia and thus more accurately determine a course of action in the treatment of the orthodontic patient.

Although the general dentist and non-orthodontic specialist may never utilize cephalometrics in private practice, it is beneficial for such individuals to be acquainted with the terminology and methodology of the technique so as to better understand orthodontic diagnosis and more intelligently communicate with orthodontic colleagues.

The faculty of the Department of Orthodontics at the University of Washington has elected to institute a learning series which would familiarize the dental student with the basic principles of cephalometrics, the most commonly used cephalometric measurements, and an introduction to evaluation of cephalometric findings.

B. Support Staff

The following individuals will participate in the organization and implementation of this instructional unit:

Design and Planning Committee:

Dr. X (Pediatric Dentistry)
Dr. Y (Pediatric Dentistry)
Dr. Z (Orthodontics)
Dr. A (Media Specialist)
Dr. M. (Pedodontics)
Ms. N (Dental Hygiene)
Mr. O (Dental student)

Instructors

Dr. X
Dr. Y
Dr. Z

Media Specialists

Dr. A
Mr. B
Mr. C

Secretarial Staff

Mrs. D.
Ms. E

C. Management Controls

The Design and Planning Committee of the Department of Pediatric Dentistry will initiate and develop the instructional program. The committee will be composed of all full and half-time faculty of the department, as well as one faculty member each from the Departments of Orthodontics, Pedodontics, Audiovisual Materials and Dental Hygiene plus one dental student representing the second year dental class. All decisions relating to content, course objectives, sequencing of topics, illustrations, teaching method, etc. will be developed through action of this committee.

Staff function is as follows:

Staff	Function
Design and Planning Committee	Unit Organization
Participating Faculty	
Dr. X	Instruction
Dr. Y	Instruction
Dr. Z	Instruction
Media Specialists	
Dr. A	Learning resources advisor
Mr. B	Photographer
Mr. C	Medical illustrator
Secretarial Staff	
Mrs. D	Prepare all written materials
Ms. E	Organize and dispense materials

D. Learner Population

The learner population will consist of the following individuals:

Dental Students (second year undergraduates)

Dental Hygiene Students (senior)

Prerequisite courses include the following:

Anatomy (osteology of the head and neck)

Physiology

Dental Roentgenology

Students entering this learning program will all have considerable experience in general and dental x-ray technique and interpretation. They will have been exposed to roentgenographic cephalometric films in their clinical contacts but in general will have little specific knowledge regarding the use, methodology and interpretation of such radiographs.

E. Relevant Course Material

The Design and Planning Committee in organizing this learning program will utilize relevant undergraduate and graduate course material, syllabi, and teaching aids which have been collected by staff members through site visits of national and international orthodontic programs. The Committee will also have access to course syllabi and examinations available at the University of Washington, Department of Orthodontics as well as published guidelines to course content available through the American Association of Orthodontics and the American Dental Association.

E. Relevant Course Material (cont'd)

Pertinent references include:

Moore, A. Cephalometrics as a Diagnostic Tool. J.A.D.A., 82:775-780, 1971.

Horowitz, S., Hixon, E. The Nature of Orthodontic Diagnosis. C. V. Mosby Co., St. Louis, 1966.

Downs, W. The Role of Cephalometrics in Orthodontic Case Analysis and Diagnosis, A. J.O., 38:162-182, 1952.

Graber, T., Orthodontics, Principles and Practice. 2nd Ed., W. B. Saunders Co., Philadelphia, 1957.

Krogman, V., Sassoni, V. Syllabus in Roentgenographic Cephalometry. Philadelphia Center for Research in Child Growth, Philadelphia, 1957.

Individualized learning programs:

Little, R. Cephalometrics Part I & Part II. T. V. Tape, 1972.

Little, R. An Individualized Learning Program - Roentgenographic Cephalometry - Measurement of Tooth and Jaw Position. Programmed Booklet, 1973.

F. Instructional Context

Curriculum Position: It is recommended that a 30 hour block of lecture and laboratory time be assigned to the Department of Pediatric Dentistry during the winter quarter of the second year of dental school for the purpose of introducing the dental student to diagnostic methodology. The Design and Planning Committee has the responsibility of choosing specific subject matter and has decided to include a five hour sequence on roentgenographic cephalometry. Non-orthodontic graduate students who will also participate in this section of instruction will be notified of meeting time and place.

F. Instructional Context (cont'd)

Five separate meetings of one hour each will be sequenced directly after a five hour block on the subject of facial analysis and growth assessment.

Instructional Setting: Classes will meet in room T747 of the Health Sciences Building at the time as yet to be designated. This classroom is capable of seating 130 individuals and has the capacity for simultaneous or multi-media usage including lectures, T.V., movies, 2x2 slides, glass slides, overhead overlays, and chalkboard. All group instruction will transpire in this setting with individual instruction material being available through the Audiovisual Library of the Health Sciences Building.

G. Behavioral Objectives

Terminal objectives are as following:

1. When presented with a cephalometric radiographic film, the student will be able to determine the specific linear and angular measurements utilized in the Northwest Cephalometric Analysis.
2. When presented with a cephalometric radiographic film the student will be able to compare the linear and angular measurements obtained with population norms and assess areas of special deviation of dental and skeletal components from the normal.

H. Performance Measures

1. Linear and angular measures derived from cephalometric films must be within $\pm 1^{\circ}$ or $\pm$ 1 mm. of absolute accuracy.
2. The student will be asked to compare measurements computed from cephalometric films and with 90% accuracy describe the specific and overall deviation from population means and ranges within one standard deviation.
3. The student will be expected to defend any conclusions he reaches regarding deviation of the dental and skeletal components from normal growth.

I. Enabling Objectives

Terminal and enabling objectives are as follows:

1.0 When presented with a cephalometric radiographic film, the student will be able to determine the specific linear and angular measurements utilized in the Northwest Cephalometric Analysis.

1.1 When presented with a human subject the student will be able to itemize and describe the most common methods of skeletal and facial analysis.

1.11 Without reference to notes or other material, the student will be able to recall the reasons necessitating development of the cephalometric technique.

1.111 The learner will be able to describe the advantages and disadvantages of plaster face casts and facial photographs in the analysis of facial pattern.

1.112 The student will be able to describe the original Broadbent-Bolton Cephalometer and explain its functioning parts.

1.113 Given a cephalometer, the student will be able to name the parts, critical distances used, and method of head positioning of the patient.

1.12 Given a series of cephalometric radiographs, the student will be able to point out the most common inaccuracies in the cephalometric technique.

1.121 Comparing several headfilms of one patient, the student will be able to identify inaccuracies due to flexibility of the soft tissue of the patient's ears.

1.122 The learner will be able to point out inaccuracies in the cephalometric technique by noting asymmetries in several patients' vertical position of ears.

1.123 Given several films taken on a single patient the student will be able to note enlargement in skeletal structure images resulting from discrepancies in object-film distance.

1.124 On a single cephalometric film, the student will be able to draw on a piece of tracing paper both sets of bilateral skeletal and dental structures noting which are left sided and which are right sided images.

1.13 Given a series of cephalometric radiographs of a single patient, the student will be able to list the information available from such films.

1.131 The student will demonstrate how the technique can assess growth and development.

1.132 The student will be able to characterize the facial type present on the head film series noting the presence or absence of constancy.

1.133 Noting the character of the facial type in question, the student will demonstrate how such information can be used for preparation of a diagnosis and treatment plan.

1.2 Given a human skull and an x-ray of the skull, the student will demonstrate knowledge of anthropologic landmarks usable in cephalometrics.

1.21 Without referral to reference material, the student will be able to discuss the criterion and characteristics of reliable cephalometric landmarks.

1.22 The student will be able to identify the major skeletal and dental structures both on the skull and on the radiograph.

1.123 Given a cephalometric radiograph, the student will be able to locate and identify the nine most commonly used cephalometric landmarks.

1.3 Given an acetate tracing of a cephalometric radiograph, the student will be able to determine to within $\pm$ 1° or $\pm$ 1mm. of absolute accuracy the most commonly used cephalometric measurements.

1.31 Given a cephalometric tracing, the student will be able to list and determine the six commonly used measurements of jaw position.

1.311 The student will be able to measure angle SNA in determining the position of maxilla to cranium.

1.312 The learner will be able to demonstrate the ability to accurately measure spatial position of mandible to cranium by determining the following angles: SNB, SN-Pg, SN-MP, Y axis.

1.313 Having determined maxillary and mandibular measurements, the student will be able to demonstrate the relationship of maxilla to mandible.

1.32 Given a cephalometric tracing, the student will be able to list and determine the 10 most commonly used measurements of tooth position.

1.321 The student will be able to accurately assess interincisal angle, overbite and overjet when given a cephalometric tracing.

1.322 Using cephalometric measurement techniques, the student will be able to determine the relative spatial position of maxillary central incisor to maxilla.

1.323 Given an acetate tracing, the student will be able to relate the spatial position of the mandibular incisor to the mandible.

2.0 When presented with a cephalometric radiographic film, the student will be able to compare the linear and angular measurements obtained with population norms and assess areas of spacial deviation of dental and skeletal components from the normal.

2.1 The student when presented with cepahlometric measurements will be able to recall the normal mean values and ranges within one standard deviation of the mean.

2.11 The student will be able to recall normal values related to comparison of maxilla with cranium position.

2.12 The student will be able to recall established values for angles representing mandible to cranium position.

2.13 The student will be able to relate average values for maxilla to mandible and relate the range within $\pm$ 1 S.D.

2.14 The student will be able to recall linear and angular average normal values for maxillary to mandibular teeth.

2.15 The student will be able to recall established values of maxillary incisor to maxilla.

2.16 The student will be able to recall established values of mandibular incisor relative to mandible.

2.2 The student when presented with a series of cephalometric measurements or a cephalometric film will be able to assess specific areas of spatial deviation relative to established normal patterns of dental and skeletal position.

2.21 The student when viewing a radiographic film will be able to note deviation of maxillary growth.

2.22 Given a cephalometric film and measurements, the student will be able to assess mandibular deviation from population norms.

2.23 The student will be able to identify on a given cephalometric film any deviation from the normal range of maxillary to mandibular position.

2.24 Given a cephalometric tracing the student will be able to compare incisor position with normal values and detect areas of abnormal deviation.

2.25 In a particular cephalometric radiograph the student will be able to assess the facial profile type, relate it to the underlying skeletal pattern and note deviation from the established normal value.

2.251 The student will be able to differentiate profile types among a series of tracings.

2.252 The student will be able to compare different profile types with esthetically pleasing cases.

J. Enabling Performance Measures

Performance criterion for enabling objectives will be established for all written and oral examinations. Demonstration of adequate performance will be established at the 90% level as satisfactory on all knowledge material. Linear and angular measurements must be within $\pm 1^{\circ}$ or $\pm$ 1mm. of absolute accuracy for a satisfactory rating. Much of the material will be reviewed through self instructional packages with built-in feedback loops in the event of unsatisfactory performance. Higher cognitive levels will be subjectively assessed through oral evaluation at a 90% criterion level.

K. Types of Learning

The types of learning presented in this sequence are categorized according to a model recommended by Gagne. Much overlap between categories naturally will occur but this classification can be used as a general guide to the relative position of terminal and enabling objectives within a learning hierarchy.

TYPES OF LEARNING (GAGNE)

S-R Connections

Discriminations

Motor Chains

1.0
1.124
1.22, 1.23
1.3, 1.311, 1.312, 1.313, 1.321, 1.322, 1.323

Verbal Chains

1.111, 1.112, 1.113
1.121, 1.122, 1.123
1.131, 1.132, 1.133
1.21

Concepts

1.1, 1.11, 1.12, 1.13
1.2
1.31, 1.32
2.11, 2.12, 2.13, 2.14, 2.15, 2.16
2.251, 2.252

Principles

2.1, 2.21, 2.22, 2.23, 2.24, 2.25

Strategies

2.0, 2.2

L. Learning Conditions

The learning environment will primarily involve a total of three hours of lecture/discussion, one hour of laboratory/discussion, and one hour of written and oral evaluation. Lecture/discussion sessions will be in a classroom setting with overhead transparencies, slides and chalkboard used to illustrate the verbal statements of the lecturers. The laboratory section will be in the same class setting with each student provided with appropriate working materials. The class will proceed through the exercises as a group, the instructor guiding progress on the same exercise by means of an overhead projector. Written evaluation will occur as a group, oral evaluation and discussion accomplished by smaller sections of twenty students each.

Individual instruction materials will be available for students to be used between class sessions and will cover all phases of the instructional unit in detail.

M. Adaptations to Individual Differences

Considering the nature and experience of the learners, it is anticipated that the formal class sessions as planned will result in 75%+ reaching performance criterion without additional learning. Based on a lack of performance as evidenced by discussion performance and progress examinations, certain individuals will be encouraged to consult the individual learning programs which have been developed for this package. The Department of Orthodontics is concerned with encouraging the entire group to perform as high above criterion level as possible, therefore, use of the individualized learning packets will be advocated.

N. Form of the Instructional Event

The following format of instructional events is outlined to illustrate enabling objectives, terminal objectives, learning experiences, instructional method, media, time, and evaluation method:

HOUR 1

OBJECTIVES	LEARNING EXPERIENCES	METHOD	MEDIA	TIME (Min.)
1.111, 1.1	Principles of anthropologic measurement Definition of cephalometrics	Lecture	2x2 Slides	
1.112	Development of technique		2x2 Slides	
1.113	Principles of technique		2x2 Slides	
1.113	Apparatus		2x2 Slides	
1.121, 1.122, 1.123, 1.124, 1.12	Inaccuracies of the technique		2x2 Slides	
1.131, 1.132	Information available from technique		Chalkboard	
1.133, 1.13				50
1.1	Examination	Written quiz	Worksheet	10
				Total 60

Further study:

TV Tape - Cephalometrics, Part I	Independent study	TV Tape
Cephalometric Radiographs	Independent study	Handout

HOUR 2

OBJECTIVES	LEARNING EXPERIENCES	METHOD	MEDIA	TIME (Min.)
	Introduction to tracing x-rays	Lecture		
1.22	Identification of skull structures		2x2 Slides	
1.21	Criterion of cephalometric landmarks		Chalkboard	
1.23, 1.2	Anthropologic terminology			
1.31, 1.311, 1.312, 1.313	Measurement of jaw position		Overlay	
1.32, 1.321 1.322, 1.323	Measurement of tooth position			
1.2, 1.3	Laboratory - Trace films and compute measurements	Lab/discussion	Overlay & Worksheets	Total 60

Further study:

TV Tape - Cephalometrics, Part II.	Independent study	TV Tape

HOUR 3

OBJECTIVES	LEARNING EXPERIENCE	METHOD	MEDIA	TIME (Min.)
1.3	Laboratory - cephalometric measurements	Lab/discussion	Overlay & Worksheets	
	Introduction to concept of normal	Lecture	2x2 Slides	
2.11, 2.12	Normal values - means, range standard	Lecture	Overlay	
2.13, 2.14	deviation			
2.15, 2.16				
				Total 60

Further study:

Programmed packet - Cephalometric Measurement, Part I	Independent study	Programmed packet

HOUR 4

OBJECTIVES	LEARNING EXPERIENCES	METHOD	MEDIA	TIME (Min.)
2.0, 2.1	Examination	Written quiz	Worksheet	
1.31, 1.32				
1.2				10
2.21, 2.22	Assessment of deviation	Lecture	Overlay	
2.23, 2.24,	from normal			
2.25				
2.25	Facial profile types			
2.251, 2.252	Facial profile deviation			
2.2, 2.21,	Laboratory: Assessment of deviation	Lab/discussion	Overlay & Worksheets	
2.22, 2.23,				
2.24, 2.25				45
				Total 55
	Further study:			
	Programmed packet - Cephalometric Measurement, Part II	Independent study	Programmed packet	

HOUR 5

OBJECTIVES	LEARNING EXPERIENCES	METHOD	MEDIA	TIME (Min.)
	Review	Discussion	Overlays	20
1.0, 1.1, 1.2, 1.3, 2.0, 2.1, 2.2	Terminal behavior evaluation	Oral examination- 20 students/group		40
				Total 60