Are orthodontic educational opportunities adequate?

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IN 1958 I made a study of current graduate orthodontic training and presented my findings in a paper before the Workshop in Orthodontics which was held at the University of Michigan and sponsored by the American Association of Orthodontics and the Kellogg Foundation. The title—"An Evaluation of Graduate Training as Preparation for Specialization in Orthodontics"—could well be used for the material that I am discussing here.[1] Much of what I presented then is pertinent. The passage of almost five years since the completion of this study lends a perspective and permits us to appraise the validity of the concepts and projections entertained at that time.

In August, 1960, one of the most important pronouncements on orthodontics as a specialty, entitled "Survey of Specialty Practice in Orthodontics," appeared in the AMERICAN JOURNAL OF ORTHODONTICS.[2] This succinct and cogent report, prepared by B. F. Dewel and presented before a conference of National Organizations for Areas of Dental Practice held in Chicago in June, 1960, by the Board of Trustees of the American Dental Association, has great significance for us and merits prime consideration as a strategic document in our efforts to assess orthodontic training today. The officers of both the American Board of Orthodontics and the American Association of Orthodontists cooperated in this project, and the statement bears their signature of approval.

Of considerable help in the preparation of my material has been Hollinshead's[3] *Survey of Dentistry,* published in 1961, with a comprehensive analysis of the many-faceted problems of dental education. The surveys by Weber[4] and the Bureau of Economic Research and Statistics of the American Dental Association have helped to make this study as current as possible.[5, 6, 25]

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THE PROBLEM OF SPECIALTY TRAINING

As we mull over the preliminary material, and as we prepare to organize a larger conference on orthodontic education, a number of questions arise. How is the present demand for orthodontics being met? On the basis of a five-year study of projections made in 1957, are we keeping pace with population increase and building for the future? What is the current status of orthodontic specialty training with respect to student selection, educational facilities, adequacy of faculty, and course material being presented? What recommendations would we like to make, based on our analysis of the present status? What kind of job is being done now with undergraduate orthodontic education, and what changes should be made to strengthen this vital part of dental education? Since we constantly admonish each student concerning his sacred obligation to himself and his community *after* he graduates, do we provide him with the opportunity in adequate continuation and refresher courses? How can we implement G. V. Black's maxim that "a professional man cannot be other than a continuous student"?

The major part of this article is devoted to adequacy of orthodontic specialty training, according to present conditions and current trends. Solving some of the problems here will help immeasurably in undergraduate and continuation education.

NEED FOR ORTHODONTICS AND ORTHODONTISTS. In September, 1959, a report entitled "Orthodontics in 1969" appeared in the AMERICAN JOURNAL OF ORTHODONTICS.[7] It was based on more than 1300 questionnaires answered by orthodontists and attempted to make projections for the next ten years. The report indicated that there will be a greater need for orthodontics and orthodontists in the next ten years. The four-year period that has elapsed since this questionnaire was sent out confirms the projection. There are more than 20,000,000 children under 5 years of age, and 4,000,000 babies are being born each year. There are 34,000,000 children between 5 and 13 years of age, representing a 40 per cent increase in the past ten years. As predicted by the Census Bureau, an even greater increase is taking place in the number of children of orthodontic age, the 10- to 19-year age group. By 1969 there will be 13,000,000 more children in this group. There are 66,000,000 children under 18 years of age right now.

Since various surveys show that approximately one-half of all children born could profit from orthodontic guidance and that at least one-fifth actually need orthodontic care, the answer to whether there is a need for orthodontics and orthodontists, figuratively speaking, is obvious. As of mid-1961,[8-10] according to the latest American Dental Association reports, there were 2,209 orthodontists for 181,428,200 persons, or one orthodontist for every 82,131 persons. There are approximately 3,000 A. A. O. members at present.

The population per orthodontist varies broadly among states and among districts within the states. For example, Alabama has 1 orthodontist for every 182,139 persons, but the ratio for the Montgomery region is 1 to 300,167. In Arkansas the over-all state ratio is 1 to 222,613, but in the Hot Springs region it is 1 to 432,600! Lest anyone think that the South has a monopoly on such astro-

nomical ratios, the state of Indiana has a ratio of 1 to 168,314, but the ratio for the Gary district is 1 to 615,000!!!! Of interest also are the ratios of 1 to 112,400 for the state of Maryland and 1 to 148,571 for the Baltimore region; 1 to 60,599 for Missouri and 1 to 56,113 for the St. Louis region; 1 to 52,963 for New York State and 1 to 46,460 for the New York City region; 1 to 72,859 for Illinois and 1 to 56,823 for the Chicago district; 1 to 92,647 for the state of Florida and 1 to 61,164 for the Miami region; 1 to 115,632 for Tennessee and 1 to 96,427 for the Knoxville region; 1 to 61,398 for the state of Washington and 1 to 62,459 for the Seattle region; 1 to 85,019 for Oregon and 1 to 55,057 for the Portland district. The lowest region or district ratio was in the North Platte district in the Omaha region—21,200 persons to 1 orthodontist. The many significant entries of one region or district after another with more than 100,000 persons and no orthodontist points up the critical shortage.

Setting up ratios based on children only, as was done in the *Orthodontics in Mid-Century* volume, based on 1958 manpower figures, the geographical distribution of orthodontists per million persons under 18 years of age (Table I)

Table I. *Number of orthodontists per million persons under 18 years of age**

State rank	*State*	*Orthodontists*	*State rank*	*State*	*Orthodontists*
	United States	32			
1	District of Columbia	102	25	Kansas	25
2	California	63	26	Louisiana	25
3	Colorado	60	27	Delaware	24
4	Connecticut	58	28	Pennsylvania	24
5	New York	55	29	Minnesota	22
6	Nevada	53	30	Nebraska	21
7	Rhode Island	52	31	Tennessee	19
8	Massachusetts	46	32	Wisconsin	18
9	Washington	45	33	Georgia	17
10	Michigan	40	34	North Carolina	17
11	New Jersey	39	35	Indiana	16
12	Florida	37	36	Kentucky	16
13	Missouri	37	37	Maine	16
14	Illinois	35	38	North Dakota	16
15	Oregon	35	39	West Virginia	16
16	Iowa	33	40	New Mexico	15
17	Texas	33	41	Vermont	15
18	Montana	30	42	Virginia	15
19	Oklahoma	30	43	Alabama	12
20	Utah	30	44	Idaho	12
21	Arizona	27	45	South Dakota	12
22	Maryland	26	46	New Hampshire	11
23	Ohio	26	47	South Carolina	9
24	Wyoming	26	48	Mississippi	8
			49	Arkansas	7

Derived from data published in 1958 *Directory* of the American Dental Association.

*From Moyers, R. E., and Jay, Philip: *Orthodontics in Mid-Century*, St. Louis, 1959, The C. V. Mosby Company.

Table II. *Ranking of states by population 5 to 14 years of age per orthodontist at alternative levels of estimated need*

Rank	*State*	*Population per orthodontist*	*10 per cent*	*50 per cent*	*80 per cent*
	United States	18,910	1,891	9,455	15,128
1	District of Columbia	4,850	485	2,425	3,880
2	Nevada	6,333	633	3,166	5,066
3	California	10,763	1,076	5,382	8,610
4	New York	11,209	1,121	5,604	8,967
5	Connecticut	11,700	1,170	5,850	9,360
6	Colorado	12,045	1,204	6,022	9,636
7	Rhode Island	12,800	1,280	6,400	10,240
8	Missouri	13,633	1,363	6,816	10,906
9	Michigan	13,634	1,363	6,817	10,907
10	Massachusetts	14,706	1,471	7,353	11,765
11	Washington	15,267	1,527	7,634	12,214
12	New Jersey	15,566	1,557	7,783	12,453
13	Delaware	15,750	1,575	7,875	12,600
14	Illinois	16,449	1,645	8,224	13,159
15	Florida	17,333	1,733	8,666	13,866
16	Texas	17,363	1,736	8,682	13,890
17	Iowa	17,615	1,762	8,808	14,092
18	Oklahoma	17,955	1,796	8,978	14,364
19	Wyoming	19,000	1,900	9,500	15,200
20	Ohio	21,667	2,167	10,834	17,334
21	Louisiana	21,885	2,188	10,942	17,508
22	Nebraska	23,300	2,330	11,650	18,640
23	Minnesota	23,458	2,346	11,729	18,766
24	Kansas	24,429	2,443	12,214	19,543
25	Maryland	24,789	2,479	12,394	19,831
26	Pennsylvania	25,100	2,510	12,550	20,080
27	Utah	27,167	2,717	13,584	21,734
28	North Dakota	31,250	3,125	15,625	25,000
29	Kentucky	31,889	3,189	1 5,944	25,511
30	Tennessee	32,510	3,215	16,075	25,720
31	New Mexico	32,600	3,260	16,300	26,080
32	Wisconsin	35,389	3,539	17,694	28,311
33	North Carolina	35,583	3,558	17,792	28,466
34	Oregon	36,375	3,638	18,188	29,100
35	Arizona	37,000	3,700	18,500	29,600
36	Indiana	37,100	3,710	18,500	29,680
37	Georgia	37,632	3,763	18,816	30,106
38	Montana	38,000	3,800	19,000	30,400
39	Virginia	38,235	3,824	19,118	30,588

Derived from data included in the 1958 *Directory* of the American Dental Association.

Table II Cont'd

Rank	*State*	*Population per orthodontist*	*10 Per Cent*	*50 Per Cent*	*80 Per Cent*
40	West Virginia	39,100	3,910	19,550	31,280
41	Idaho	40,333	4,033	20,166	32,266
42	South Dakota	42,000	4,200	21,000	33,600
43	Maine	54,000	5,400	27,000	43,200
44	Vermont	67,000	6,700	33,500	53,600
45	South Carolina	68,857	6,886	34,428	55,086
46	Alabama	70,000	7,000	35,000	56,000
47	Mississippi	74,500	7,450	37,250	59,600
48	New Hampshire	92,000	9,200	46,000	73,600
49	Arkansas	119,667	11,967	59,834	95,734

shows that for the United States as a whole, in 1958, there were 32 orthodontists per million children, with a range of 102 orthodontists per million in the District of Columbia to only 7 per million in Arkansas. If we delineate the orthodontic age range further and limit the figures to children between the ages of 5 and 14 years (Table II), we can see the tremendous responsibility that the orthodontist faces. Even operating at the 10 per cent level, taking care of only 10 per cent of children in this 5- to 14-year age range, the smallest case load would be 485 per man in the District of Columbia and 11,967 per man in Arkansas.

In northern suburbs of Chicago, such as Wilmette, Winnetka, and Glencoe, more than 50 per cent of the children in certain school classes are currently wearing orthodontic appliances. If this ratio were repeated on a nationwide scale, each orthodontist would be treating an astronomical number of patients—ranging from 59,834 in Arkansas, down to 35,000 in Alabama, 19,000 in Montana, 12,550 in Pennsylvania, 8,224 in Illinois, 6,816 in Missouri, and 3,166 in Nevada, just to pick a few states at random. Even this broad geographical range in available orthodontic services does not show the true picture. Most of the orthodontists are concentrated around the larger cities. The rural population is not being served. It is not at all uncommon for a child to make a 150 to 200 mile round trip for each adjustment appointment in many areas of the Middle West, South, Southwest, Plains States, and Far West.

Facing these facts, our A. A. O. membership has strongly recommended the expansion of graduate training (Fig. 1).

CURRENT STATUS OF ORTHODONTIC EDUCATION

How are we implementing the desire of the profession to train more orthodontists in the face of the demand for services and mounting need? What is the current status of orthodontic educational opportunity? What has been our rate of growth during the past five years?

In 1958, Dr. Weber[4] of the University of Tennessee sent a questionnaire to orthodontic departments with questions on current status of departments, student selection, faculty make-up, school fees, etc., together with five-year

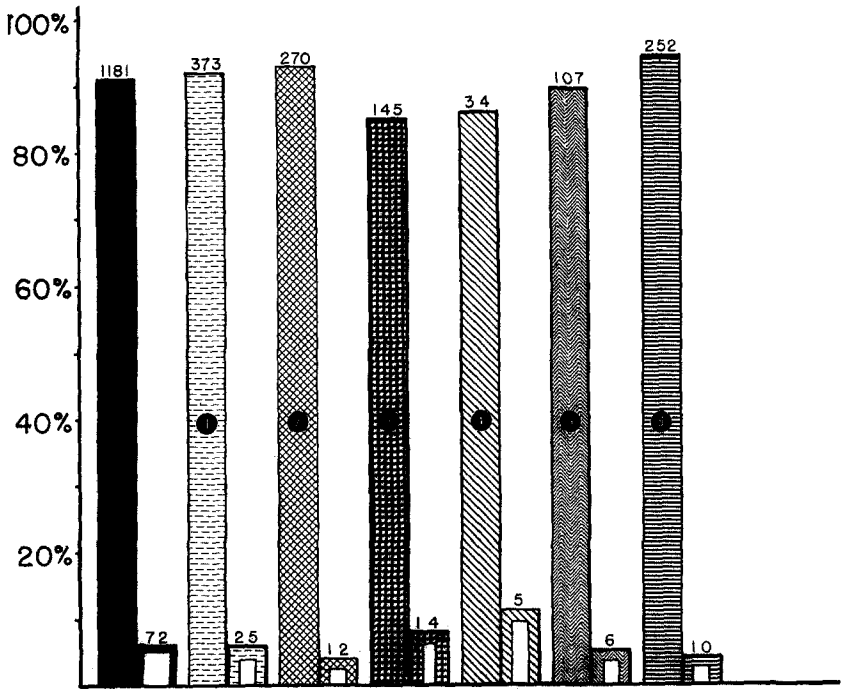

Fig. 1. Should more universities give graduate orthodontic training? Survey results showing overwhelming approval by A. A. O. members of expansion of graduate training of more orthodontists. Solid bars show affirmative opinion; open bars indicate negative opinion; black bar represents total for the country. *1,* Northeast; *2,* Middle West; *3,* South; *4,* Plains States; *5,* Southwest; *6,* Far West and Hawaii.

projections on courses and number of students. At about the same time, a joint survey by the Education Committee of the American Association of Orthodontists and the Council on Dental Education of the American Dental Association assessed similar information.[5]

NUMBER OF COURSES OF INSTRUCTION. Of the 47 institutions studied, 28 were giving graduate and postgraduate instruction in orthodontics (Fig. 2). Twelve schools had graduate programs only, 6 had postgraduate programs only, and 10 had both graduate and postgraduate programs (Fig. 3). All schools were asked if they planned to start a course in the next five years, and 14 schools indicated that they would. In interpreting these figures, one must take into account the overlap of graduate and postgraduate courses (10 schools), since it is a rule to start students on a postgraduate status for a certain period of time and to admit them to graduate status later. In some schools the student may continue on the postgraduate status or go on a graduate basis and get a degree instead of the certificate which is given to the person completing the postgraduate program. The University of Illinois is an example of this. As the chart indicates, in 6 schools it was possible to get only the postgraduate certificate; in 12 schools only a graduate degree was available.

Among schools that planned to start a program in five years, the University

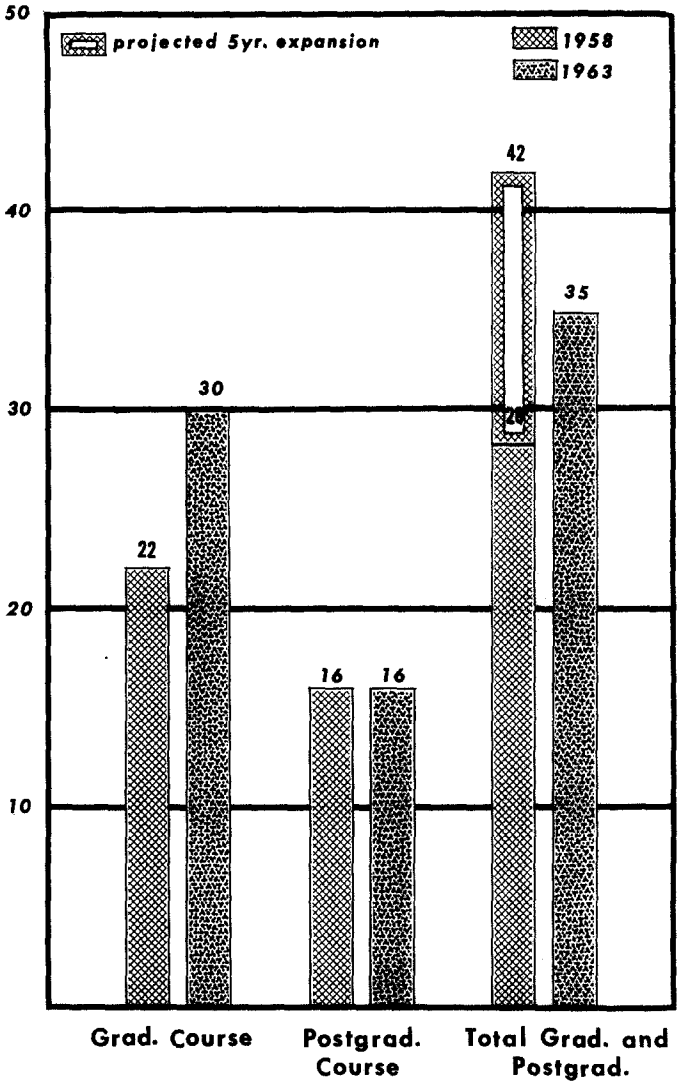

Fig. 2. Graduate and postgraduate courses in 1958 and 1963. The hollow bar on the right shows the five-year increase as estimated in 1958; the solid bar on the extreme right represents the actual increase.

of Maryland, Georgetown University, Howard University, and the Medical College of Virginia have not done so, although Dr. McIver will start a course at the Medical College of Virginia in 1963. Dr. Sassouni plans to start a course in 1963 at West Virginia University. Loma Linda University and Boston University, though not listed in the 1958 survey, also have courses. Thus, the only accredited schools that will not have courses by next year are the College of Physicians and Surgeons in San Francisco, the University of Louisville, Loyola University of New Orleans, the University of Maryland, the University of Detroit, Howard University, Georgetown University, Creighton University, Seton Hall University,

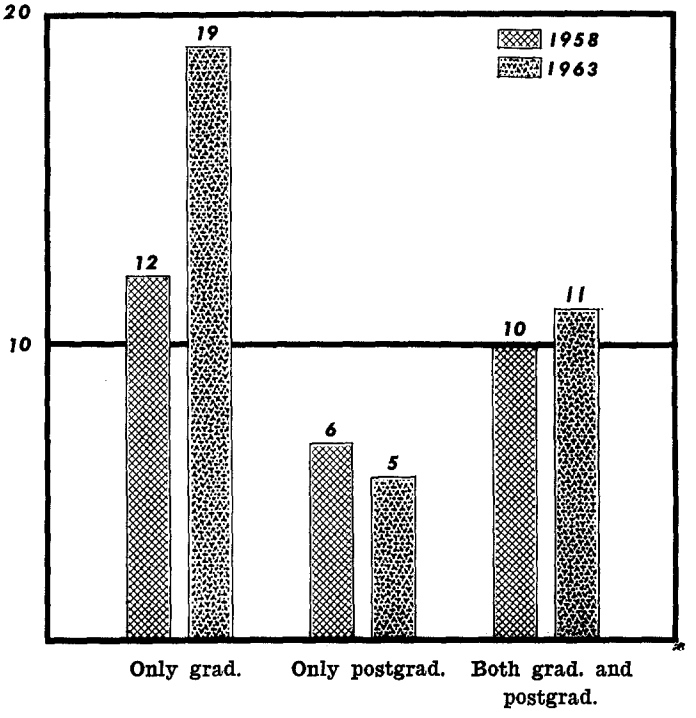

Fig. 3. Graduate and postgraduate distribution of orthodontic courses offered in 1958 and 1963 in dental schools in the United States.

the University of Puerto Rico, and Meharry Medical College. The University of California has the Curriculum II program, and Boston University does not have a dental school but gives courses in orthodontics. Thus, only 13 dental schools do not now give post-D. D. S. orthodontic training.

Putting the current status in a more positive way, as of July, 1962, 33 of the 47 accredited dental schools in the United States offered formal postdoctoral orthodontic specialty training. Thus, there are 19 institutions with graduate courses only, 5 with postgraduate courses only (a drop of 1), and 11 with both graduate and postgraduate courses, making a total of 35 schools. The University of California with its Curriculum II program, which also turns out orthodontists, brings the net total to 36 institutions. At least 2 of the remaining 13 schools will have courses by the end of next year. To bolster the ranks of trained men, five of six Canadian schools are providing graduate or postgraduate courses.

In 1957 there were 207 graduate programs and 100 postgraduate courses in various areas of dentistry, with 73 per cent of the dental schools offering graduate training and 59 per cent offering postgraduate training. In 1962 the A. D. A. Survey lists 344 graduate programs offered at 87 per cent of the accredited dental schools, with an increase of 66 per cent over the number of graduate programs offered five years ago.[6] At present 161 postgraduate programs are being offered by 70 per cent of the accredited dental schools. This means a healthy increase of 61 per cent. Orthodontics and oral surgery top the list.

Since a large number of these postdoctoral programs are superimposed on a physical plant that was originally meant for D. D. S. training only, this can be considered quite satisfactory progress, numerically speaking.

NUMBER OF STUDENTS. The number of institutions giving training means little unless one knows how many men are being trained each year. The knowledge that a certain number are admitted for each course must be qualified by the length of the course itself. An analysis of the various schools shows that the number graduated may vary from one to twelve each calendar year. Figuring is complicated by part-time programs, such as the one at New York University, special foreign students, and teaching fellowships. An additional difficulty lies in figuring schools which have both graduate and postgraduate programs, as these schools list their maximum capacities twice in the various surveys.

An increasing number of men are working on their Ph.D. degrees and, as in the case of teaching fellowships, usually are not included in the surveys of formal orthodontic courses. Some men drop out; others continue for additional work. It is impossible to arrive at an exact number of graduates. Even with the increase in the average course length (Fig. 4), 197 men were being graduated

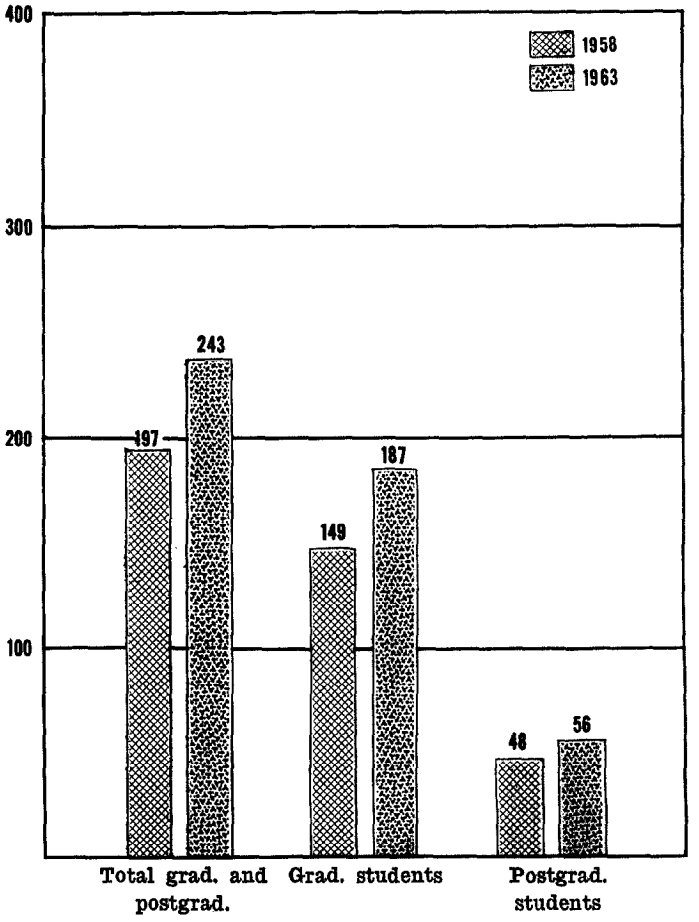

Fig. 4. Number of students graduated from graduate and post graduate courses in 1958 and 1963.

from combined graduate and postgraduate programs in the fall of 1958; this figure has risen to 243 in 1962. Students completing graduate courses and receiving advanced degrees increased from 149 to 187; those awarded postgraduate certificates showed a smaller increase from 48 to 56. The 243 figure is the result of the A. D. A. Survey, plus a number of personal communications and long-distance telephone calls to heads of departments to ascertain the actual number of students enrolled at the moment. This figure represents an annual increase of 9 per cent of the total American Association of Orthodontists membership.

It must be borne in mind that the foregoing are gross figures, not net increases in our professional manpower. When our questionnaire was circulated in 1958 approximately 10 per cent of the profession indicated that they would retire in the next 10 years. An annual retirement figure from all causes now would approach 2 per cent. Many are not working at full capacity; some are partly retired. Case load varies tremendously, so a further conditioning of these figures is essential. An exact work-hour ratio is not possible.

STUDENT SELECTION. Recognizing the great demand and need for orthodontic care, many dentists have sought formal orthodontic training. In 1958 Faustin Weber's[4] survey studied the problem of student selection. School acceptance of applications ranged from a low of 3 per cent to a high of 30 per cent, with an average of 11 per cent. Because of the shortage of available training places, many apply at two or three institutions; thus, this percentage does not reflect the true picture. A more realistic figure would be one acceptance for every four applications. The knowledge that only the highest scholastic standing will qualify an applicant has discouraged many a man desiring orthodontic training, however, so it is not unreasonable to assume that orthodontic departments would not have too much difficulty in filling their vacancies with qualified candidates, even if they were able to double their facilities. The increase in course length, coupled with a general reduction in the number of applicants for dentistry proper, has improved the applicant–available space ratio. It is still necessary for a man to have much higher academic standing to get into orthodontics than into the other specialties. Opportunities in less popular specialties go begging in some institutions today.

For applicants who live in states that do not have orthodontic training facilities, the orthodontic manpower problem is still critical. More than one-third of all schools give preference to residents of their own states, excluding many a well-qualified man from some other state. It is unrealistic to outlaw the only means of obtaining orthodontic specialty training in these areas with no school facilities, but great public demand, unless we are prepared to provide equal or better training facilities. Continuation of *properly regulated* preceptorships under the aegis of the A. A. O., such as those that are now in effect, is desirable. In addition, the establishment of accredited and recognized hospital residencies would help to ease the problem; this subject is discussed further in the section on recommendations.

Fig. 5 shows that at the present time there are 29 states that have no formal orthodontic training courses: Alaska, Arkansas, Arizona, Colorado, Connecticut, Delaware, Florida, Hawaii, Idaho, Kansas, Kentucky, Louisiana, Maine, Mary-

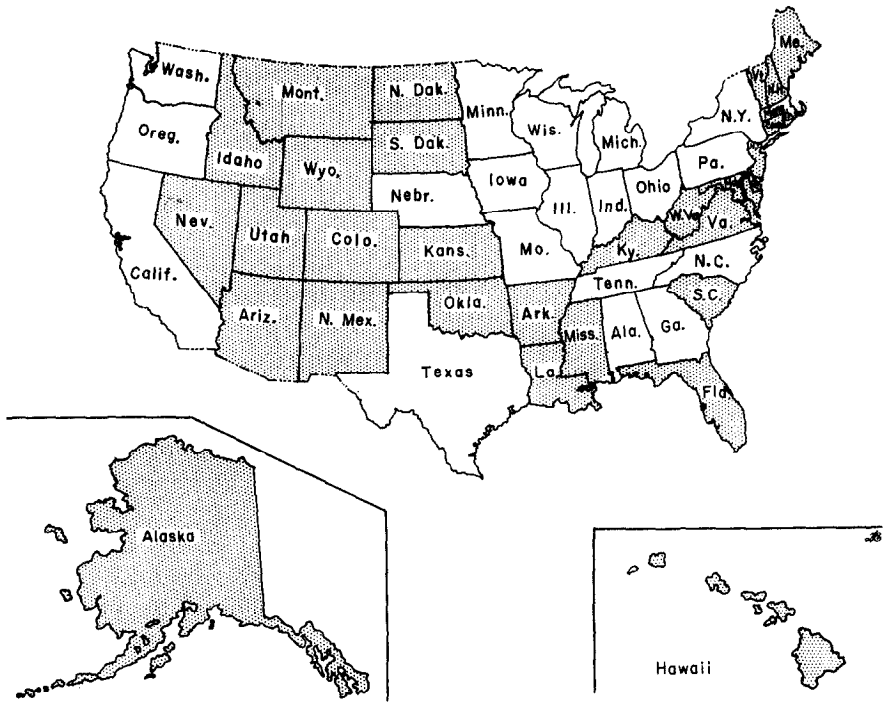

Fig. 5. Map showing states with no formal orthodontic education opportunity (shaded areas). Schools in thirteen of the remaining twenty-one states have resident-preference requirements for admission.

land, Mississippi, Montana, Nevada, New Hampshire, New Mexico, North Dakota, Oklahoma, Rhode Island, South Carolina, South Dakota, Utah, Vermont, Virginia, West Virginia, and Wyoming. Even in states in which there are schools that offer orthodontic training, the facilities do not begin to cope with the demand. For example, both Emory University in Georgia and the University of Alabama take only 2 students for a 24 month course and Nebraska serves a large area with 3 graduate students, and all three schools give preference to state residents. Thus, we see the state of affairs of orthodontic manpower in many areas of our country. Putting it another way, only 21 out of 50 states plus the District of Columbia have orthodontic training facilities. Institutions in 13 out of 21 states have resident-preference rules. Let us think about training men where they are needed most. In our zeal to "uplift the profession" and to raise standards, we must look at the whole picture. This requires a broad perspective and an ability to appreciate all circumstances which generate conflicting concepts as to just what is best for orthodontics.

Before we move on to the subject of facilities, let us consider the current status of student selection requirements in graduate and postgraduate courses. The variability of requirements between orthodontics and other specialties is quite obvious, as I pointed out earlier. This is due partly to the law of supply

and demand. As indicated in some detail in my paper in *Orthodontics in Mid-Century,*[1] there is just no uniformity. Criteria of selection are quite often lower in postgraduate courses than in graduate courses. Fortunately, the great demand for orthodontic training has allowed all schools to pick from the best, and there is relatively little difference from school to school in the actual caliber of students. There is a difference, however, in listed requisites from graduate to graduate and from graduate to postgraduate training facility. A minimum set of requirements *must* be developed, as I recommended in 1958. On a long-range basis, the consolidation of all institutional training on a graduate basis and the elimination of postgraduate status (except for foreign students perhaps) would be beneficial.

PHYSICAL FACILITIES IN USE. With the rapid growth of orthodontic departments from a mere handful before World War II to more than 35, with the tremendous increase in all postgraduate education, and with specialists competing for space in schools built to educate dentists first, it is no wonder that a great range in physical plants exists. In the older schools particularly, clinical facilities are sparse and decentralized. Some lack adequate research facilities; others have no library or seminar room; still others have no laboratory or laboratory technician and one must double up with other graduate and undergraduate students and "make do." This is no criticism of any school in particular. Most have done an admirable job of squeezing in graduate programs on already inadequate undergraduate setups. The first duty is to train competent dentists. The cost of land, buildings, equipment, and staff is prohibitive for most private institutions these days. The dental school dean has an almost impossible job in trying to meet the demands of all departments. He has no alternative in many instances but to group similar departments in multi-use facilities. Until new buildings are created, these forced marriages are the only alternative to no graduate training at all.

One unfavorable sequela of inadequate facilities is the pairing off of the orthodontists and pedodontists. Since they both work on children, use the smaller chairs, require similar waiting room facilities, etc., this arrangement seems logical to the harassed dean who is looking for any combination that will make the best of the space deficiency. The services rendered and the training required by the two specialties are vastly different, however. In orthodontics pain is no problem, whereas the *raison d'être* for pedodontics historically evolves from the problems created during a painful dental procedure on an apprehensive, immature, and uncooperative patient. Few dentists wanted to tackle the management problems involved. Pedodontists stepped into the breach and have succeeded admirably in coping with restorative procedures for the young patient, and the demand for their services in this aspect alone exceeds their available time.

However, there has been a creeping encroachment on orthodontics. Use of the same facilities in training, constant association with orthodontists, great public demand for orthodontics and the inadequate supply of trained specialists, the seeming simplicity of appliance adjustments to some who are not aware of the tremendous demands in clinical training and judgment, and other considerations have teamed together to broaden the pedodontic horizon by trespassing on

orthodontics. The fact that the pedodontist sees the child first and recognizes an orthodontic problem and his quite honest desire to do so-called "preventive orthodontics" also tend to attract the pedodontist to orthodontics. Such orthodontic therapeutic measures as serial extraction, seemingly so simple, requiring only the removal of teeth without the need for complicated appliances, have had a fatal attraction to some men in the field of children's dentistry. They have realized only too late the great demands of careful diagnostic procedures, an extensive knowledge of growth and development, the importance of treatment timing, and the ability to step in at the right time with efficient multiple banding techniques, extraoral force, etc. to create the desired dentofacial health and harmony.

Thus, highly important aspects of orthodontics, the oldest specialty in dentistry with the third oldest specialty board in medicine or dentistry, have been arrogated by persons who lack the training or ability to treat these cases. For the good of the public we serve, it is imperative that orthodontists safeguard their legitimate field of endeavor. A statement outlining the broad limits of our specialty, prepared by Dr. Dewel in conjunction with officers of both the American Board of Orthodontics and the American Association of Orthodontists, appeared in the August, 1960, issue of the AMERICAN JOURNAL OF ORTHODONTICS.[2] It is most important that we discourage the idea that, just because orthodontists and pedodontists have been forced together by inadequate physical facilities in the past, this must be the pattern of the future. Entirely separate autonomous departments will best serve both specialties and the public.

Despite United States Public Health Service matching-fund building programs for new schools, it will be some time before conflicts of this type can be resolved. Orthodontics as a whole is wary of federal support, which may be the leading edge of a two-edged sword, the sharper trailing edge being federal control.

Where new schools have been built with thought given to graduate training, beautiful, efficient, unified orthodontic departments exist, with adequate clinical, laboratory, research, library, and seminar facilities. More such departments are desperately needed.

STAFF. It has been said many times that a school is only as good as its teachers. Orthodontic training courses follow this rule. Good students are important and physical facilities obviously must be adequate, but the best course falls short with inadequate instruction. Of all the problems in orthodontic education today, that of staff is the greatest. Solve it, and many others will be solved in the process. In the past five years there were as many as nine orthodontic departments looking for heads. One waited five years to fill a vacancy while badly needed training facilities remained idle. The survey of staffs by Faustin Weber in 1958 pointed up the critical need for qualified teachers, and I made a strong point in my paper at that time that this was indeed the Achilles heel of orthodontic education.[1]

It is painfully obvious that there are entirely too few full-time teachers, too few half-time teachers, and too many half-day-a-week teachers; as a result, there are too few schools with integrated teaching programs. The names of the

"big men" could be found in school catalogues, but try to find these men in person on the clinic floor! Often, in many schools, teaching assignments were handled by recent graduates who were spending part of their time at school until their practices merited more time. Too many full-time men had become half-time men and half-time men had become half-day-a-week men as private practice demands increased. Successful clinicians could be found in teaching capacities, but we have known for a long time in all fields of dentistry that the ability to teach is not automatically tied to the ability to perform. Some of the best clinicians are the poorest teachers. Teaching is not something you "pick up" as you go along. Proper didactic training and experience—with a liberal measure of dedication—are essential.

What was true in 1958 is still true, if we are candid in appraising staff and personnel problems in orthodontics. How many departments have full-time members—full-time orthodontists—on their staff? How many departments have full-time heads? How many departments have staff members who have been subjected to didactic and forensic training to qualify them for their jobs? Is running a department, where one is responsible for the orthodontic training of anywhere from 5 to 25 men at one time, a full-time job or not? If it takes at least five years for a graduate orthodontist to develop reasonably adequate clinical judgment in a field where diagnostic signposts are not always in full view, how many treatment decisions should be made by the neophyte teacher?

Most of the answers can be explained by one word—*money*. What is true in general education is even more true in orthodontic education. Teachers are relatively poorly paid. A man can do better financially in private practice without much effort. He is his own boss, he makes his own decisions, he renders a service to the community for which he is well paid, and he need not become involved in the politics that sometimes rears its ugly head in educational institutions. Why teach? Who started that vicious quip, "If you can, do; if you can't, teach"? How many times has it been said, "He teaches, because he couldn't make a success in private practice"? How this maligns the dedicated teacher; how it wrongs the real pedagogue! Like a kernel of corn in the popper, it has been blown to a size completely out of proportion to the fact. If the respect and recognition that justly belong with teaching are not there, if the sacrifice made by a truly interested and dedicated teacher is the subject of ridicule, if the financial return is poor in teaching but rich in practice, it does not require a clairvoyant to predict the direction most men will turn.

Two things, then—more money and more recognition—are essential. Little help can come from school budgets. Federal subsidies are another possibility, but the A. A. O. membership was opposed to this in the survey made in 1958.[7] The last alternative is assistance from organized dentistry and orthodontics, as outlined by Dallas MacCauley[11] in his 1962 presidential address in Los Angeles. As an example of what we as a group might do, the A. A. O. might agree to subsidize 100 full-time teachers in orthodontics, augmenting their present salaries with a $5,000.00 annual stipend each. This $500,000.00 obligation is quite a responsibility. Spread among 2,500 members, it would amount to only $200.00 per year per man before taxes. Since it is deductible in the form of dues, it

would come nearer to $100.00 per man "out of the pocket." Can we afford to spend this fraction of the fees from one case per year to safeguard orthodontic education? Can we afford *not* to spend this sum for this worthy purpose? Such a plan is in effect already in the American Medical Association.

The alternative might be a compromise, as recommended by the 1960 *Survey of Dentistry*.[3] In addition to private support from our members, we must approach foundations and interest them in supporting free enterprise. At the same time, limited federal aid with no strings attached concerning student selection, curriculum control, and related factors would be welcome—and a much more worth-while endeavor than some of the unregulated educational support squandered abroad. We should move in and assume a larger role in the education of orthodontists, as predicted and recommended by our A. A. O. membership.[7] Solving this problem for graduate and postgraduate orthodontic education will do much for similar considerations on the undergraduate level and ensure that the didactic assignments in our own field will be handled by orthodontists, not by others who have inherited them by default, flowing into a vacuum created by our prior occupation with private practice. One has only to look at the increasing number of course announcements from universities these days to see who is giving the "preventive orthodontics" courses or who is writing articles in pediatric and pedodontic journals on limited orthodontic problems, etc.

It is in the basic science teaching assignments that most orthodontic courses are best prepared. The current status is good and should improve as experience with the specific demands of orthodontics is gained. The staff for this phase of orthodontic training is usually adequate.

THE COURSE ITSELF. Jackson,[12] in his essay on "Orthodontic Perspective," quotes Professor Whitehead of Harvard as dividing educational development into three stages:

I. Romance—the stage of initial appreciation
II. Precision—where breadth of the relationships is subordinate to the exactness of formulation
III. Generalization (perspective)—a return to romanticism, with a blending of classified ideas and relevant techniques

It is in the first stage that the fresh, uninhibited mind, full of creative imagination, inventive ingenuity, and personal skills and conditioned by the faculty of common sense, develops the very foundations of a field of endeavor.

Very soon the pioneer realizes that he must organize his thoughts, sift his ideas, and classify and correlate his concepts with attempts at some standardization of values if he is to impart his concept to others. As hypotheses develop into arbitrary rules, he sets up a procedure which will absorb some of the responsibility from the shoulders of the individual and, as Jackson says, *precision* becomes an irresistible attraction. The profound, compulsive obsession, then, is categorizing, classifying, quantifying, and pigeonholing. It effectively subordinates the creative imagination and inventive ingenuity so necessary in the birth and continued development of the subject at hand.

The third stage, for both the individual and his field of interest, is a swing

of the magnetic pendulum back toward that wonderful romantic initial stage of appreciation, holding onto choice aspects of the second stage to give the broad perspective of generalization and discretionary evaluation.

In the third stage, the educator realizes that there is more than classification of factual knowledge, that a philosophy based on deductive logic and common sense, tempered by genius, intuitive perception, natural and acquired skills, and creative imagination is the ultimate. Thus, the pyramid of science, philosophy, and art is born (Fig. 6).[13]

Orthodontics fits neatly into this pattern, and I wish that time allowed us to philosophize more, to draw the parallels that exist between the broad concept of educational development and the specialty of orthodontics. Dr. Jackson[12] has done this magnificently in his article entitled "Orthodontic Perspective."

Orthodontics has revelled in Stage II long enough, clinging to convenient crutches and cliches of classification. In the beginning these crutches served a real purpose, but only as tools to implement and correlate the first developmental stage of orthodontic infancy. In too many instances, the tool became the be-all and end-all of our endeavors. As a strait jacket, appliance systems stifled deductive logic and common sense, inventive ingenuity, and imagination with

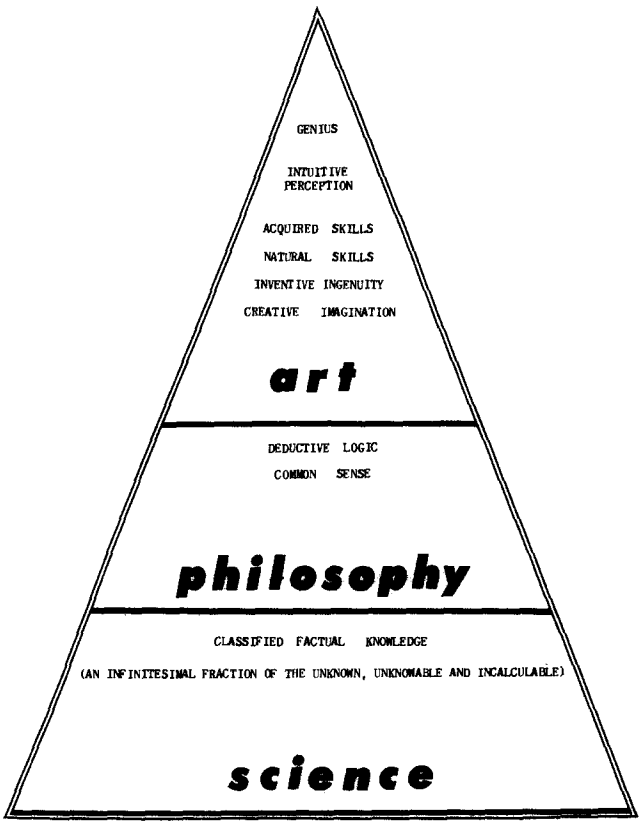

Fig. 6. Jackson pyramid exemplifying the multidiscipline approach to orthodontics. (From Jackson, A. F.: The Science, Philosophy, and Art of Orthodontic Practice, AM. J. ORTHODONTICS **44**: 771, 1958.)

oppressive dogma. A victim of its own creation, orthodontic education fostered what I like to call the "Procrustean-bed syndrome." Every patient had to fit the mold, even as guests of that mythological innkeeper were stretched or hacked down to size to fit his beds. Formal orthodontic specialty education has had no monopoly on this syndrome. Cults based on strict appliance orientation and abject obeisance to doctrinaire rules of procedure have flourished in various areas of the country, under different individuals at different times. It is the responsibility of orthodontic education to carry its students well into Whitehead's third stage of development, producing a broad perspective based on a blend of basic sciences, clinical philosophies, and an artistic appreciation of facial form and function—stimulating the students to think, to lead, and not only to follow. Neat formulas, pat treatment procedures, and arbitrary diagnostic templates can only lead to a sterile, proliferating mediocrity. As William James,[14] the psychologist, has said, "I have expressly avoided the outward appearance of doctrine and system, the definitions, classifications and subdivisions, and multiplications of technical terms, because I knew that these things tend to substitute an artificial schematism for the living reality!" Such criteria in orthodontics must be the means, not the *end.*

Obviously, in an appraisal of orthodontic educational opportunity it is not enough to know the number of students being admitted and the facilities and staff available. What is the current status of orthodontic courses? As in the other categories, orthodontic education needs some more uniformity than is present.

DEGREES OFFERED. Recognition of specialty orthodontic training is rendered in the form of a degree or certificate. The M.S., M.S.D., and M.Sc.D. degrees are most commonly awarded at the end of a graduate program. The trend is toward the M.S. only, which may be considered favorable, since it is in line with degrees given by other academic departments which have graduate study. Generally speaking, special graduate degrees in dentistry have been considered inferior. At present 21 schools give the M.S., 8 give the M.S.D., and 2 give the M.Sc.D. (Fig. 7). As for the doctorate, 3 schools now give the Ph.D. and one gives the D.Sc.D., the former being the preferred academic degree.

Where postdoctoral orthodontic training is not under the university graduate school, but under the dental school itself, a certificate of satisfactory completion is awarded. As variable as course content and requirements can be for graduate degrees—and such variability is admittedly excessive at present—the broad range of didactic material in postgraduate courses is greater. In the academic sphere, certificates largely imply clinical proficiency and are not accorded the same measure of recognition as a formal degree. Despite the fact that some postgraduate orthodontic courses compare favorably with graduate courses, it would be better to gear all courses to the graduate level, under the auspices of the university's general graduate faculty if possible. All dental education would profit as a result.

COURSE LENGTH. One of the factors contributing to the present lack of uniformity of post-D.D.S. orthodontic training is the broad range of course lengths. In 1959 the Education Committee of the American Association of Orthodontists[21]

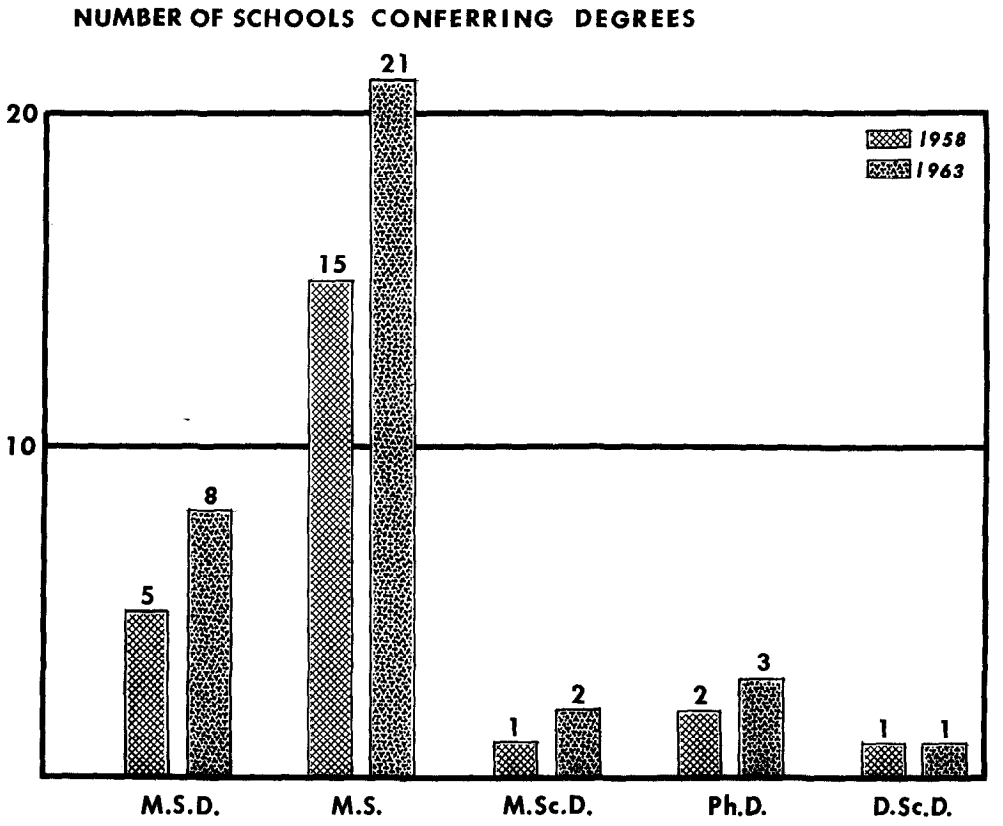

Fig. 7. Different degrees being offered in graduate orthodontics in 1958 and 1963.

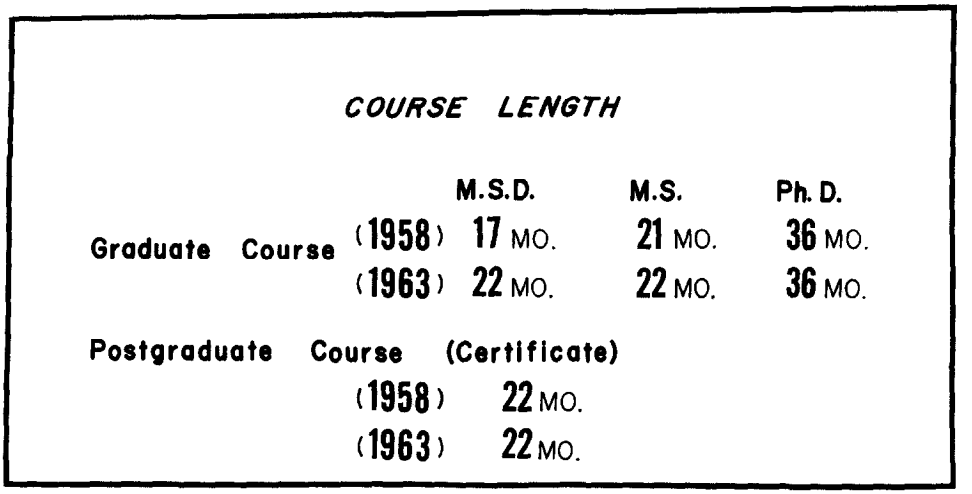

Fig. 8. Increase in course length over past five years for graduate and postgraduate orthodontic instruction.

recommended some minimum requirements covering this aspect of the problem, and I would certainly endorse them. With respect to graduate courses in orthodontics, the Committee recommended that (1) the program should run at least 24 continuous months, and preferably 30 months, and (2) the student should be full-time in orthodontics. For postgraduate courses in orthodontics, a program of 24 continuous months was deemed preferable. Such recommendations are in line with those proposed by the Committee on Advanced Education of the American Dental Association. The average length of a course at present is 22 months, but course lengths vary from 16 to 30 months, depending on the school. Obviously, a 16 month course is not comparable with a 30 month course. One cannot assume that because a course is longer it is better, but the chances are that at least the student has more opportunity to learn in a longer course. The trend is in the right direction (Fig. 8), with an increase in the average course length from 17 to 22 months in the past five years.

Before discussing the particulars of the present orthodontic courses themselves, it is appropriate at this point to refer to Dr. Dewel's[2] perceptive analysis of orthodontics as a specialty:

> Orthodontics considers that its principal responsibility is the supervision of growth and development of the dentition and associated facial structures from birth through to dental maturity. Prevention of malocclusion is the highest objective of orthodontics. The specialty welcomes assistance in space maintenance, tooth preservation, and habit correction from the general dentist and other specialties, but all corrective procedures involving tooth movement and requiring either functional or mechanical treatment are the responsibility of the orthodontist. These have been traditional areas of orthodontic practice throughout the history of the specialty.
>
> To a certain degree, a moderate overlapping of services exists between all specialties. A need exists, however, to define the major areas of dental practice that fall within the jurisdiction of each individual specialty. The American Association of Orthodontists urges that this be done so that no specialty will find it possible to extend its area of specialization to include services that more properly belong to another specialty. . . . While it realizes that every ethical dentist is licensed to practice in all areas of dental practice, the American Association of Orthodontists shares a general concern with other specialties over the identification of specific areas of specialized practice. By the very nature of the term, *specialization* implies a limitation of treatment procedures to one restricted field of professional practice. If this were not true, then each specialty would, in fact, be engaged in general practice rather than in a circumscribed specialty area.

The present Council is convened to implement the A. A. O. desire to define the major areas of our specialty, even as we study the educational machinery by which we inculcate our students with the desired information. Our interest in curriculum is paramount. As we dissect the corpus and subject the individual parts to impartial scrutiny, the tendency is to stress the negative, even as the pathologist ignores great masses of normal tissue to analyze the abnormal. It is not my intent to imply a proportionate relationship between our problems and the emphasis placed on them in this article. Rather, I recognize that the greatest part of orthodontic education is good, much of it outstanding, and that is our springboard. Our aim is to keep this oldest and largest of dental specialties, venerated as it is for its rich and respected traditions, in the vanguard of dental education. I am confident that other specialties are also engaging in a similar

type of self-analysis to maintain and uplift their professional standards and service, even as we are.

BASIC SCIENCE VERSUS CLINICAL STUDY. Considerable controversy has been engendered in dental education over just how much training should be "practical" and how much should be "theoretical." Basic sciences are usually relegated to the latter category, but with strenuous objections from some educators who believe that we already have too much clinical emphasis in dentistry because of the primarily mechanical tradition and daily practice procedures. A proper balance should be established. But what ratio creates the balance?

The Education Committee of the A. A. O. tackled this problem last year and recommended that the student should devote at least half of his time to clinical practice and laboratory work, with the other half being spent on reading assignments, formal lectures, seminars, and research. Such is not the case in some graduate and postgraduate courses today. Without naming names, it would not be difficult to find a course dominated by theory and basic science any more than it would be hard to find one in which little more than lip service is paid to head and neck anatomy, growth and development, anthropology, genetics, oral physiology, etc. It is my earnest hope that we can develop a brochure incorporating the essentials of an adequate advanced training program in orthodontics, as the oral surgeons have done in their field, financed by the Fund for Dental Education.[15, 16] Such a manual would not only help us across the country, but it would have world-wide appeal. Australia and New Zealand, for example, are just now setting up graduate programs and look to us for guidance. As an excellent starting point, the curriculum developed by Study Group II at the University of Michigan Workshop is recommended and approved as an integral part of the August, 1960, "Survey of the Specialty of Orthodontics" compiled by Dewel.[1, 2] The required subjects, electives, and suggested clock hours are given in the recommendations section of this article.

APPLIANCE ORIENTATION. The great diversity of appliance philosophies and techniques offered in graduate and postgraduate training is evident in the compilations of the 1958 A. A. O. Survey.[4, 5] Equally variable is the number of hours spent by each student in clinical practice during the first or second year of training. Department heads were asked to record the clinical experience and appliance techniques used. The averages are 564.5 hours for the first year and 553.3 hours for the second year, but the array of individual time estimates is tremendous. Figures range from 15 hours per week to 304 per year to 1,281 clock hours for the first year. There is no cluster around any particular time estimate. The same spread is in effect for the second year, ranging from a low of 260 to a high of 1,105 hours. Some minimum standard is clearly necessary.

With reference to appliance philosophies and techniques, each department head was asked to estimate the amount of time spent on edgewise, universal, twin-wire, labiolingual, and removable appliances in his school's graduate clinics. The range on edgewise appliances was from 10 per cent at the University of Alabama to 100 per cent at St. Louis University and the University of Washington. Labiolingual percentages ranged from 0 to 50, and similar variations were demonstrated for other appliances. Nineteen schools taught the edgewise

technique (56.6 per cent), 12 schools taught the twin arch technique (20.1 per cent), 12 schools taught the labiolingual technique for an average of 16.2 per cent of the total case load, 4 schools allocated an average of 2.1 per cent of the time to headgear treatment, and the same number of schools averaged 2.4 per cent for the Crozat appliance. In postgraduate courses the range is even greater, both in clinical hours and in appliance emphasis. Among graduate schools, the "all-or-none law" is in evidence in three schools, and essentially so in four others. Similar "feast-or-famine" percentages are encountered in postgraduate orthodontic courses. The Council on Education of the A. A. O. considers this overwhelming emphasis on one appliance undesirable in the light of bitter experience in the military service and the festering problem of transfer cases. They recommended the following:

> 1. Since the transfer of patients in orthodontics is such a problem, even though it is not possible to "master" even one appliance or system of orthodontic therapy in the graduate program, it is advisable to emphasize one appliance technique and to familiarize the graduate student with more than one of the other most commonly used appliance techniques by *lecture and clinical experience.*
> 2. Students should treat a sufficient number of patients, using each type of mechanotherapy, in order to be proficient. Merely reading the theory will not suffice; the student must have clinical experience.[21]

It is safe to say that the percentages given above would be completely different today with the great swing to the use of the so-called differential light forces. In many instances, the term "edgewise" or "twin-wire" would now refer only to the band attachment and not to the philosophy of treatment. In this respect, the impact of the differential light forces has been good, for it has broken down many of the system barriers and cultism tendencies in certain areas. So long as it does not supplant them with a similar image-oriented system, emphasizing technical procedures instead of principles, orthodontics is the beneficiary. However, evidence at hand indicates that evangelistic fervor in some quarters is working at cross purposes with the broadening trend.

RESEARCH REQUIREMENTS. Not much needs to be said on this subject. Generally speaking, a research project and thesis are part of the work required for a master's degree. In postgraduate training this is not usually the case, although in some courses research projects are assigned as an academic exercise to familiarize the student with research methodology. We can be quite proud of orthodontic research over the years. More research has been done on a graduate level in orthodontics than in any other field. In the same spirit of self-examination, however, we should be critical of our efforts where they have fallen short of adequate. In no facet of orthodontic education has this happened more often than in research. Under the guise of that magic word *research,* we have emulated the metaphysicians of the Middle Ages, who wrote great tracts on the number of angels on the head of a pin. Biometricians point out the incredible naïveté of orthodontic research in the early 1950's when everybody was rushing in to join the "great numbers racket" by calling it cephalometric investigation. Also

apparent has been the egocentric tendency for some schools or groups to rely only on research they have done ("the only true research" as the head of one department told his graduate students), ignoring the efforts of others which might conceivably be of some value.

The great stimulus given dental research by the United States Public Health Service and the National Institutes of Health has also benefited orthodontics, and most of the research projects are on a firm basis. The caliber of research being done in different institutions is still excessively variable, however, and there are still entirely too few men capable of directing graduate student research, let alone carrying it on independently. As long as research is used as "window dressing" in some institutions, as long as graduate students engage in undirected or misdirected projects merely to satisfy academic requirements, and as long as research projects are chosen at random with no over-all coordination, we are making a farce out of this phase of orthodontic education. The need for integrated research programs is great, and recommendations will be made later on this subject.

PRECEPTORSHIPS. No appraisal of the adequacy of orthodontic educational opportunity can be complete without a brief analysis of this time-honored method of training. As we all know, many of our greatest leaders in medicine and dentistry have emerged from such associations. I do not propose to go into the controversy that has been engendered over preceptorship versus graduate training. There is no argument by anybody that a good graduate course is superior to most preceptorships or that some properly guided preceptorships are superior to many graduate courses. We must ask ourselves: "What is best for the most?" Certainly not those preceptorships that in the past have been nothing more than glorified slave labor for a man whose practice is so busy that he needs someone else to do the heavy work and thus increase the office income. Certainly not the graduate or postgraduate courses which distinguish themselves by giving degrees for regurgitated textbook material that a competent student could master in half the time or by putting the big names in the catalogues and having the recent graduates do the teaching.

The crucial question is: "Is there sufficient adequate orthodontic educational opportunity provided by graduate and postgraduate training today to meet the demand?" As an educator with two graduate degrees and 18 years of graduate teaching under my belt, and as one who has seen as many orthodontic departments on the face of this globe as anybody, I must answer, in all fairness, a resounding "No!" The map that shows 29 of our 50 states with no formal orthodontic training possibilities speaks for itself (Fig. 5). The knowledge that schools in 13 of the 21 states with formal courses have resident-preference rules and the fact that the demand for *all* orthodontic training facilities far exceeds the supply of available places means that we are not meeting the present challenge, let alone the increasing demands of an expanding and better-educated public.

In the entire country, there are only approximately 106 men in associateship training courses under the A. A. O., and it is estimated that only 25 men complete the regulated programs each year (as opposed to 243 from formal courses).[16] This is totally inadequate, and the A. A. O. rules are so stringent

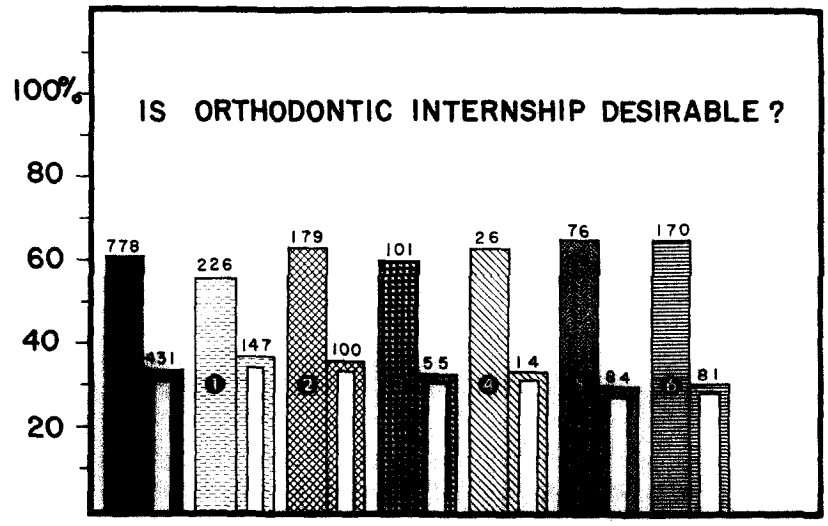

Fig. 9. Response of members of the American Association of Orthodontists to question of orthodontic internship. Black bars give results for country as a whole. *1*, Northeast; *2*, Middle West; *3*, South; *4*, Plains States; *5*, Southwest; *6*, Far West and Hawaii. (From Graber, T. M.: Efficient Practice Management, AM. J. ORTHODONTICS **48**: 96, 1962.)

that any appreciable increase is unlikely. The present trend is toward a decrease in such programs because of the tremendous responsibility and amount of work imposed on the preceptor; yet a decrease such as that proposed by Resolution 2, which was passed by the American Dental Association last year, is unthinkable unless we are prepared to substitute equivalent educational opportunity. It is unrealistic to look to schools for this help in the immediate future. The projections that I made in 1958, based on the current rate of increase, that we would have 400 to 450 students in graduate and postgraduate training by 1965 have already been met. The schools are doing a good job, numberwise, in certain areas of the country.[7, 24]

HOSPITAL RESIDENCIES AND INTERNSHIPS. At present there are no regulated and approved orthodontic hospital residencies, although they exist in other specialties. The problem is under intensive study by our president, Dr. Salzmann, and by the Council on Education and Hospital Residencies of the American Dental Association. Our members strongly approved the idea of orthodontic internships (Fig. 9) in their replies to my questionnaire of 1959, and it is reasonable to expect some help in the orthodontic manpower picture after the A. A. O. has had an opportunity to study the situation completely in conjunction with the A. D. A. agencies. Definitive criteria are essential.[19] Unless regulation and accreditation are effective, hospital residencies and internships could become a greater evil than the worst orthodontic course or unregulated preceptorship. Under the protective mantle of an institution, these units would be largely autonomous. In the hands of poorly trained or unscrupulous men, they could render a tremendous disservice to the public and the dental profession. We must study the programs further and not be forced to make ill-advised stopgap decisions because of the pressure of orthodontic demands.

RECOMMENDATIONS

In our study of the current status of the adequacy of orthodontic educational opportunity, I have pointed out again and again the prime need for some minimum standard. The central theme running through all our recommendations is more uniformity. No system can undergo the tremendous expansion that orthodontic education has shown since World War II without having problems. It is time for us to consolidate our gains, eliminate our deficiencies, and then forge ahead to meet the challenge of the future.

FORMAL ORTHODONTIC COURSES. The following recommendations are made with a view to improving and widening the scope of formal training in orthodontics:

Student selection

1. Uniform entrance requirements should be established. With more and more dental schools setting up their post-D.D.S. training programs under the general graduate faculty of the university, student-selection criteria will become less of a problem. The graduate schools have precise requisites for applicants, and dentistry should be expected to follow them. Fortunately, the demand for training in orthodontics has been so great that admissions committees could choose from the best applicants. In general, a "B" average in dental school is a reasonable requirement. Foreign students, where accepted, should conform to the same academic status if they are degree candidates.

2. There should be a loosening of resident-preference rules in student applications to help alleviate the immediate over-all manpower problem in states with no training facilities. Such a program could be helped with grants from the National Institutes of Health or from the states in question. A subsidy would be necessary over and above the tuition, which does not cover the cost of educating an orthodontist. As more facilities become available, the program could be gradually reduced.

3. The number of students enrolled in each course should be increased. A minimum of 5 students per class is not considered unreasonable if there are adequate facilities. At present, there are nine institutions taking fewer than 5 students per class. By doubling up on clinical facilities, by careful scheduling, and by considering curriculum changes to accommodate more men in lecture courses when clinical facilities are taxed, some schools should be able to increase the annual number of trainees.

4. Graduate and postgraduate student requirements should be harmonized. Too often the postgraduate requirements are below those for graduate applicants. The man who completes the postgraduate course is considered a second-class citizen in the eyes of some of his confreres.

5. More women should be encouraged to select orthodontics as a career. All tests have shown that women are admirably suited for the detailed work of appliance fabrication and that, as in pediatrics and

pedodontics, they are well qualified for the patient-management aspect of practice.

Physical facilities

1. A five-chair clinic should be set up as a minimum, if possible. Private booths are unnecessary, for experience has shown that children are handled best in groups when subject to judgment from their peers. Efficient arrangements can be made, with only one pedestal type of cuspidor for each two units if space is a problem. An advisory committee might well be established by the A. A. O. Council on Education to assist schools with such details.

2. A working space of 9 by 9 feet should be provided for each student in every new orthodontic department, as recommended by the Michigan Workshop.[1] Sufficient space must be available for the laboratory, x-ray facilities, seminar room, research activities, and library. If possible, a departmental library containing the most commonly used references should be set up. This could be part of the seminar room.

3. Because of the constant demand for progress reports, pictures of adjustment reaction, facial photographs, model photography, etc., a suitable audio-visual facility should be an integral part of the department, permitting the staff and students to obtain uniformly good slides or photographs on routine patient visits. As a part of the facility, audio-visual slide-tape sequences may be developed to aid in teaching case presentation, etc. A library of selected audio-visual tapes from the world-wide authorities should be available for staff and student use.

4. The orthodontic department should be an autonomous unit if at all possible. It should not be part of a larger "children's department," since this introduces undesirable sequelae and does not serve the public best. While the highest level of cooperation with pedodontics is desirable, each specialty has its own sphere of activity.

Staff

1. Head of the department

A. Qualifications should be standardized, with the head having the same academic degree (or equivalent) as that offered the students. It is highly desirable that he be a member of the A. A. O. and a Diplomate of the American Board of Orthodontics.

B. He should be at the school on at least a half-time basis in order to run the department properly. Less than this is inadequate for the stringent demands of graduate orthodontic education. Long-range goals may well require full-time department headships as the ideal arrangement. Too many men are in positions in which they started out on a half-time basis and then gradually cut down under pressure from their practices. Such arrangements are tolerated by the administration because of the critical shortage of trained administrators and the reluctance to change.

C. The department head should devote 80 per cent of his time to teaching and only 20 per cent to administration, as recommended by the Michigan Workshop.[1] It is a sad commentary on our situation today that many part-time heads spend most of their time answering correspondence and making administrative decisions. This is work that could be delegated to others. Efficient secretarial assistance is a *must*.

D. Salaries must be revised sharply upward to reduce the great discrepancy between private practice returns and academic salaries. This is one of the most critical of all the problems facing orthodontics today, and it deserves immediate attention if we are to maintain even the present level of orthodontic education. The use of funds from the National Institutes of Health is one possibility, but we should seriously consider direct subsidy from the American Association of Orthodontists.[11] An assessment of $200.00 per member per year would be sufficient to provide salary increases of $5,000.00 per year for two key men in each orthodontic department in this country. Alumni should earmark their contributions for orthodontic department faculty salaries. As we know, such contributions may be deducted from the donor's income tax. It may be practical to combine federal aid with an A. A. O. subsidy, despite the implications of greater governmental influence.

E. The broader use of intramural practice for both department heads and staff should be investigated. Pilot programs have been successful.

2. Staff Members

A. Salary increases are the first order of business. These should be made via the same avenues open and suggested for department heads.

B. A minimum of one full-time member, in addition to the department head, is essential. On a short-range basis, the minimum for the balance of the staff could be one half-day per week per quarter or semester, as recommended by the Michigan Workshop.[1] On a long-range basis, four half-days per week would be a workable minimum for regular staff members with academic appointments.

C. If possible, a staff member should be assigned the responsibility for a particular aspect of the total graduate program and should, in turn, be directly responsible to the department head. Delegation of authority in this manner will free the chairman from some of the more onerous duties.

D. If at all possible, when permanent staff appointments are made, preference should be given to those who have had special teacher training. (Such a teacher-training course is under consideration at the University of Michigan, with federal funds to cover the expenses.)

E. Staff members should be encouraged to do independent research and to have research training so that they can direct student research. Time and facilities should be placed at their disposal. More research fellowships should be made available. Every effort should be

made to encourage continued self-education by staff members, even to the point of requiring a periodic staff report on personal research efforts.

F. A full-time orthodontic technician should be part of the staff, to relieve the staff members and students from work normally done in practice by others.

G. An audio-visual technician should be available to assist the staff member in developing his teaching program. The use of television and audio-visual tapes for technique training will increase the teaching efficiency of the department. The Education Committee of the A. A. O. recognizes the need for such audio-visual aids and is developing a series of them for its members and for schools and students.

H. Arrangements should be made with the staffs of other institutions for exchange professorships to permit the student to obtain a wider educational experience. The A. A. O. could set up a lecture pool to assist in this endeavor.

The course itself

This is the heart of our problem. The delicate balance that must be established is pointed up by a quotation from a paper on "Advanced Education in Dentistry" by Dean William R. Mann[22] of the University of Michigan:

> In graduate clinical teaching we must be aware that fundamentals should be emphasized—not technics. It has been said that dentistry and its many branches cannot be termed a true science until technics are based upon fundamentals and not taught as entities unto themselves. Each graduate student should become aware of all the methods of treatment practiced within his special field, and he should know those that are considered as the best methods. His teachers should be careful, however, that he does not come to believe that the best possible method has been found. Such a belief would have a stultifying effect upon the student and would discourage the development of an inquiring mind.

1. A model course should be set up. The University of Michigan Workshop spent considerable time and effort in developing a model graduate program, which was approved and incorporated in Dewel's[2] article on "Specialization in Dentistry." This is a good place to start providing guide lines. A curriculum such as the following could well be part of our manual.[1]

Required Subjects	*Suggested Clock Hours*
Head and neck anatomy (lecture and dissection)	75
Applied histopathology of teeth and supporting structures (lecture and laboratory)	50
Growth and development lectures (plus assigned reading)	25
Oral physiology lectures (plus assigned reading)	25
Cephalometric and oral radiology (laboratory and lecture plus assigned reading)	50
Orthodontic materials (lectures)	15
Embryology and human genetics	30
Biomechanical principles (lecture and laboratory)	50
Case treatment and case analysis (lecture and laboratory)	300

Research methodology	15
Research	300
General seminar	100
(Orthodontic and related literature may be subjects for the general seminar sessions. Guest lecturers may be brought in to cover material on clinical photography, endocrinology, pediatrics, pedodontics, periodontics, interprofessional relations, and other areas of interest to those studying orthodontics.)	
Total	1,035

Elective Subjects

These include speech physiology, child psychology, practice administration, bacteriology of dental caries, anthropology and comparative anatomy, congenital facial deformities, public speaking, manuscript preparation, and dental education. These total 150 clock hours.

Thus, in the suggested graduate curriculum there would be 1,035 clock hours set aside for required subjects, 150 clock hours designated for the study of elective subjects, 1,800 clock hours for clinical and laboratory sessions, and 2,985 total clock hours for the graduate curriculum as recommended by the Orthodontic Workshop.

2. Course length should be standardized. The suggested curriculum was made to conform to a minimum of 18 months, or two academic years. If the 24 months recommended by the A. A. O. Education Committee is to be the preferred length, clock hours would have to be changed correspondingly. Other subjects, such as anthropology, muscle training, and speech, might be incorporated. In addition, some of the electives listed would be made mandatory.

3. Degrees should be standardized. The M.S. degree is preferable, in line with the degrees awarded in other graduate fields.

4. All courses should be made a part of the university graduate school, or given the same standards.

5. Postgraduate orthodontic courses should be eliminated.

6. A broad appliance orientation and balance should be maintained in the over-all balance of basic science and clinical curriculum. Emphasis should be on fundamentals, principles, and philosophies rather than on a technique-dominated dogma.

7. A comprehensive, long-range research program leading to significant data should be instituted. Multiple parts of the problem should be assigned to graduate students to give them an appreciation of research organization and methodology and, at the same time, to allow their efforts to really mean something in the total departmental research picture. Six months for the project should be sufficient for preparing a thesis also.

8. A special teacher-training program should be instituted at selected schools under A. A. O. support, with help from the National Institutes of Health, or both. Training in research methodology and guiding others in research would be part of such a program.

9. The possibility of instituting a training program for ancillary aides, similar to the New Zealand dental nurse arrangement, should be

studied. Immediate help would come from retraining dental hygienists as orthodontic aides.

PRECEPTORSHIPS, RESIDENCIES, AND INTERNSHIPS. 1. Until equal educational opportunity exists, the A. A. O.-regulated preceptorships should be retained in those areas in which formal orthodontic education is not available. Thus far, rigidly regulated programs, such as those administered by the Pacific Coast Society of Orthodontists, have produced well-trained clinicians.

2. It would be advisable to consider setting up *properly regulated* hospital residencies and internships under A. A. O. auspices and control, with assistance from the A. D. A. Council on Education. The A. A. O. should be prepared to establish an accreditation committee, with strict requirements for such programs.[19] Such a committee would have to make actual on-the-spot appraisals. The Board of Directors of the A. A. O. must attack this problem soon. The first such programs should be set up in areas with the greatest need, if possible.

3. We should consider setting up a pilot combined university-hospital program to test the practicality of a shorter academic course in fundamentals and intense technique training, followed by a required residency.

UNDERGRADUATE EDUCATION

Undergraduate education is a subject in itself, as the Michigan Workshop proceedings indicate. Orthodontic undergraduate education is in a critical state now. Unless we institute prompt remedies with strong recommendations as to curriculum, course hours, facilities, staff, etc., we shall lose control of undergraduate orthodontic teaching. An increasing amount of orthodontic doctrine and technique is to be found in the pedodontic program under the heading of "limited orthodontics." Space maintainers, space regainers, cross-bites, diastemas, uprighting of teeth, overbite problems, bite plates, Hawley retainers, guide planes, serial extraction—these are words and concepts encountered frequently in the pedodontic vernacular. If we are not going to do the job, someone else will. Dewel clearly established this pattern in his 1960 article. Let's implement it—now.[2, 21, 23, 24]

CONTINUATION EDUCATION

Turning to continuation education, the same general observations apply with regard to standardization, staff deficiency, inadequate facilities, and plain lack of interest by the orthodontic educational hierarchy. Do you want to take a course in removable appliances? One such course is being offered by a pedodontic department; another by a hospital with a general practitioner in charge. Solve the graduate education problems, and most of the continuation education problems will assume less magnitude.

I would like to end my remarks with a quotation from Allan Brodie's[20] remarks in the April, 1962, issue of *Angle Orthodontist:*

> My entire plea, therefore, is for the orthodontist to show some concern for true orthodontic education and to attempt to regain for orthodontia the pre-eminent position among the dental specialties that it once enjoyed. Failure to do so can only lead to his identity

with the facetious definition of the specialist, "one who knows more and more about less and less." A definition that *should* characterize him as a specialist would be a "broad man sharpened to a point."

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