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AMERICAN COLLEGE OF PROSTHODONTISTS

A Survey of Deans: Trends, Challenges, and Mentoring in Prosthodontics. Part 2

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Keywords
Prosthodontists; education; survey; mentoring; faculty shortages; predoctoral curriculum.

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Presented at the Academy of Prosthodontics 89th Scientific Session, New York, NY, April 25 – 29, 2007.

Accepted May 21, 2006.

doi: 10.1111/j.1532-849X.2007.00248.x

Abstract

Purpose: This study consists of two parts. Part 1, a survey of program directors, was conducted to examine current trends in advanced education in prosthodontics in the United States. Part 2 reports on the findings of a survey distributed to the deans of US dental schools to evaluate their observations of trends in prosthodontic education.
Materials and Methods: A national, electronic survey of 55 dental school deans was distributed by e-mail to evaluate an interest in specialty training, an interest in specialization in prosthodontics, faculty shortages, programs to address faculty shortages, predoctoral curriculum in prosthodontics, opinions regarding dental specialties, and the administrative position of prosthodontics within the schools.
Results: Of the 55 deans, 44 deans responded, an 80% response rate. Only five deans reported a decrease in the number of students seeking specialty training after dental school. The remaining 39 deans reported a large increase, slight increase, or no change in those seeking specialty training. In 29.6% of the deans' responses, an increased interest in prosthodontics was reported, whereas 16 deans reported no change in the level of interest. One or more open faculty positions in prosthodontics existed at 29 dental schools, and 28 schools offered at least one incentive or a variety of incentives to recruit faculty. The respondents to the deans' survey revealed predoctoral student exposure to prosthodontists was high, and exposure to postgraduate prosthodontics students was low. A survey of internal school programs that might have an impact on an increased interest in prosthodontics revealed the presence of a predoctoral mentoring program for prosthodontics in 80% of the institutions. The clinical curriculum included treatment of a variety of cases, including complex cases as defined by a diagnostic classification system. The response to whether dental specialties should be combined or remain individual provided some interesting data. Only 40.9% of the deans responded that prosthodontics was a separate department.
Conclusion: Dental school deans reported an increased interest in specialty training. Predoctoral student exposure to prosthodontics was high due to the nature of their clinical experience and due to the exposure to full-time prosthodontics faculty. Many dental schools have programs, such as mentoring and new technology, which might have an impact on predoctoral students' increased interest in prosthodontics.

The 2002 American Dental Association (ADA) report on Advanced Dental Education revealed a 35.9% decrease in the number of applicants to prosthodontics programs and a 21.4% decrease in first-year enrollment between 1991/1992 and 2000/2001.[1] Although the following year the ADA reported that the number of applications to prosthodontics programs rose from 905 in 2000/2001 to 1069 in 2001/2002,[2] many authors called the future of the specialty into question. In

2001, Felton et al[3] reported that from 1991 to 1999 there was a 40.2% decline in applications and a 31.7% decline in enrollment. Only periodontics faced a similar decline. This was in contrast to the other specialties of endodontics, oral and maxillofacial surgery, orthodontics and dentofacial orthopedics, and pediatric dentistry, which collectively had a 12.2% increase in applications and a 3.5% increase in enrollment. From 1994 to 2002, there were more international graduates enrolled in prosthodontic programs than US graduates.[1,4] Prior to 1987, there were still some training programs in prosthodontics that were either fixed or removable prosthodontics. This period of decline for prosthodontics began just 5 years after the specialty and the ADA changed the educational standards in prosthodontics to include didactic and clinical training in both fixed and removable prosthodontics. In January 2000, the ADA also mandated changes in the educational standards regarding program length. Advanced education in prosthodontics went from 2-year programs to 3-year programs. In *Dental Education at the Crossroads: Challenges and Change* (Institute of Medicine), Field[5] projected that the percentage of specialists in dentistry would increase from 15 to 25% in the second decade of the 21st century.

Despite a decade of declining applicants, disappointing enrollment numbers for US graduates, and widespread concern within the specialty, Douglass and Watson[6] predicted a large need for prosthodontic treatment that will exceed the supply and a manpower shortage in the years 2005, 2010, and 2020. Recently, the US Department of Labor, Bureau of Labor Statistics, found higher earnings for prosthodontists than all other specialties of dentistry aside from oral and maxillofacial surgery.[7] Nash and Pfeifer[8] reported that the internal rate of return for the expenses associated with prosthodontic training was a positive finding, indicating that the prosthodontic training is a financially attractive investment and that there will be a continuing demand for prosthodontic specialty training. In another report, Nash and Pfeifer disclosed that the average net earnings for a prosthodontist were 35% higher than for general practitioners and that the average net earnings are competitive with other specialties.[9] *Forbes* magazine ranked prosthodontists with the sixth highest income level among professionals—just two places lower than oral and maxillofacial surgery.[10]

Wright et al[11] reported that advanced education programs in prosthodontics have witnessed at least a 23% increase in the applicant pool since 2000, and that US-trained graduates make up 64% of the enrollment. Part 1 of this study presented evidence that factors, such as mentoring, society's demand for a higher level of training and credentialing, data depicting current and projected income for prosthodontists, number of prosthodontic faculty at the predoctoral level, the dollar value of prosthodontic training, demand for prosthodontic services, and advances in implant, esthetic, and reconstructive dentistry, have had an impact on an increased applicant pool.

Student recruitment and mentoring have been the focus of many prosthodontics organizations, including the Greater New York Academy of Prosthodontics, which began a program in 2000. The American College of Prosthodontists (ACP) held discussions of mentoring at each of the educators'/mentors' seminars beginning in 1999, and the 2001 seminar was described by Wright in the *ACP Messenger*.[12] Friedman et al[13] described mentoring as a strategy to address recruitment. Mentoring is defined as a voluntary or reciprocal interpersonal relationship in which an individual with acknowledged expertise shares his or her experience. Mentoring relationships are usually long-term, and there are benefits not only to the protégé, but also personal satisfaction and stimulation for the mentor.

Esthetic dentistry, improvements in materials, implant prosthodontics, and the associated science and technology have all had a positive impact on the specialty of prosthodontics. In addition, this contemporary era of total body fitness and patients' expectations and self-interest are driving higher standards in prosthodontics.[14]

In a report by Haden et al, the shortage of prosthodontic faculty ranked fourth out of all specialties of dentistry.[15] Faculty shortages have been scrutinized since 1999 when the American Association of Dental Schools (now American Dental Education Association) published a report on the findings from the president's task force on the future of dental school faculty showing a high number of vacated positions, 75% of which were in the clinical sciences.[16]

Materials and methods

During 2005, a national e-mail survey was developed and distributed electronically to all US dental school deans. Current lists of deans were obtained from published ADA material. An internet company (Key Survey, Inc. www.keysurvey.com, Braintree, MA) was employed to conduct the distribution and processing of completed questionnaires, validating and processing follow-up e-mails to nonrespondents, and storage of survey information in an electronic format. A cover letter (RW and RD), which communicated the purpose of the survey and included a statement of confidentiality to safeguard data and identify respondents, accompanied all electronic mailings. Also included was a listing of a contact at the Office of Research Subject Protection at Harvard Medical School to allow the respondent an opportunity to validate the legitimacy of the survey. The information was transferred to a spreadsheet program for statistical analysis (Microsoft Excel, Redmond, WA).

As noted in Part 1, the first survey was sent to program directors. The second survey was sent to 55 dental school deans and covered several topics, including:

1. interest in specialty training and in prosthodontics among dental students,
2. the need for prosthodontic faculty and incentives used to recruit applicants for faculty positions,
3. dental student exposure to various types of prosthodontists and the types of prosthodontic cases treated at the predoctoral level,
4. internal programs, new technology, mentoring programs, and strategies being implemented to enhance predoctoral prosthodontic education and an interest in prosthodontics, and
5. ideology regarding dual specialty residencies and autonomy of the prosthodontics department.

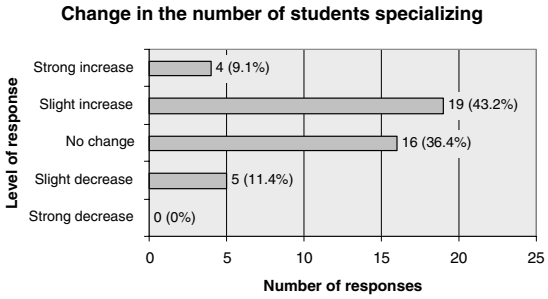

Figure 1 Have you seen a change in the number of students choosing specialty education after DMD/DDS?

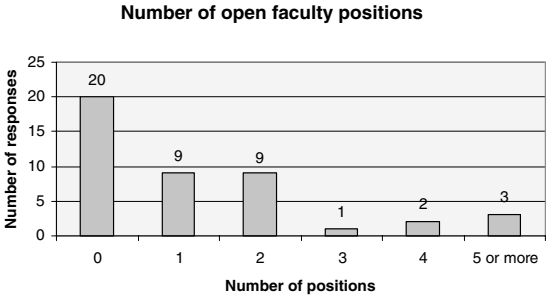

Figure 3 Number of open faculty positions in prosthodontics reported by deans' survey.

The surveys were designed to represent an overall view of the current state of prosthodontic education in the United States. The opinions of deans and program directors were viewed as legitimate indicators of change within predoctoral and postdoctoral prosthodontic education. Statistical analysis was carried out in SAS Version 9.1 (SAS Institute, Cary, NC).

The survey was sent to 55 US dental school deans. Faulty e-mail addresses can occur when new faculty members are appointed, e-mail systems are changed, or alternative e-mails are used. The software was configured to allow respondents to change entries after completion of the survey but to allow only one response per respondent e-mail address. Each potential survey respondent was given a unique link to the survey software to monitor progress of the questionnaire and to remove completed surveys from the reminder e-mail list.

Results

Respondents to the deans' survey included 44 dental school deans, for an 80% response rate. The sample represented dental schools in 32 states and Puerto Rico.

An increase in student interest in specialty training was reported by 23 deans (52.3%). Deans from 16 schools reported no change (36.4%), and only five deans (11.4%) reported a decrease in the interest in specialty training (Fig 1).

Thirteen (29.5%) deans reported a slight increase in predoctoral students' interest in prosthodontics. No change in the level of interest in prosthodontics was reported by 16 deans (36.4%). Twelve deans (27.3%) reported a slight decrease in the interest in prosthodontics among predoctoral students, and only 6.8% ($n = 3$) reported a strong decrease in the interest in prosthodontics (Fig 2).

Deans were also asked to report on the current status of prosthodontics faculty and the methods by which new faculty were being recruited. At least one open full-time faculty position was reported by 24 deans (54.5%) with 11.4% ($n = 5$) reporting four or more open faculty positions (Fig 3). Sixteen deans (36.4%) reported offering no incentives to recruit new prosthodontic faculty. Nine deans reported offering one incentive; offering multiple incentives to recruit faculty was reported by 43.2% of the respondents ($n = 19$) (Table 1, Fig 4).

Deans were asked to rate their students' exposure to prosthodontic educators using a sliding scale, 1 through 7 (7 = highest exposure, 4 = average exposure, 1 = lowest exposure). The respondents reported a below average

Table 1 Types of incentives used to recruit prosthodontic faculty members

Types of incentives	Number of responses
Relocation	20
Tuition rebates	9
Low interest home loans	2
Suitable university faculty housing	3
None offered	16
Other incentives offered	14

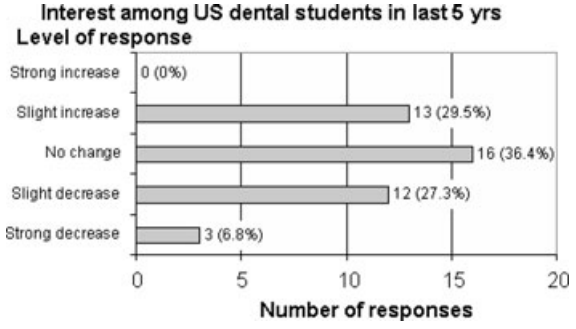

Figure 2 In the last 5 years, has interest in prosthodontics among dental students at your institution changed?

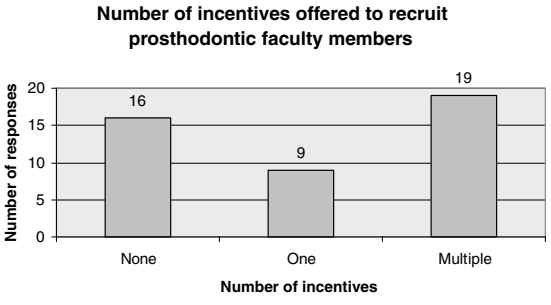

Figure 4 Number of incentives offered to recruit prosthodontic faculty members.

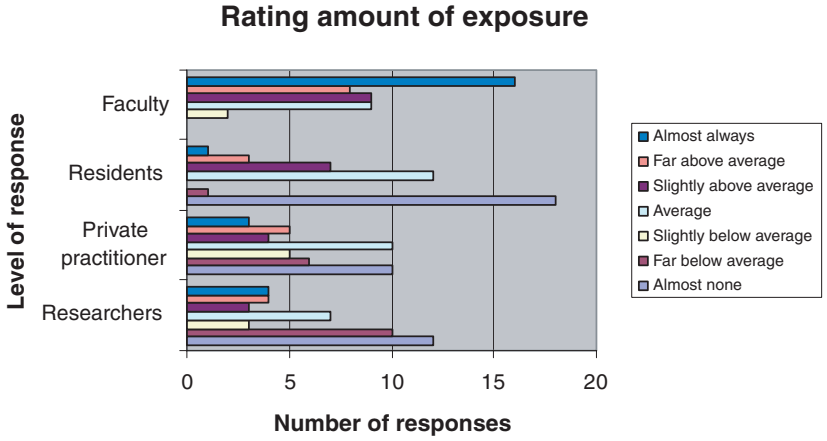

Figure 5 Exposure to prosthodontists.

rate or no exposure (scale 1 to 3) to prosthodontic residents (43.2%, $n = 19$), researchers (56.8%, $n = 25$), and private practice prosthodontists/part-time faculty (47.7%, $n = 21$). Exposure rates to full-time prosthodontics faculty remained high, with 42 dean respondents reporting an exposure level of 4 or greater despite the number of open faculty positions (Fig 5).

The ACP has developed a prosthodontic diagnostic index (PDI) for dentate prosthodontic cases.[17] Deans were asked to report the types of dentate prosthodontic cases in accordance with the ACP classification system. The category of complex implant cases was added to assess the exposure of predoctoral students to complex implant prosthodontics. The following is a list of the types of cases that were listed in the survey:

1. simple cases with minimally compromised dentition (Class 1),
2. complex cases with minor changes in occlusion (Class 2),
3. complex cases involving adjunctive therapy (endodontics, periodontics, oral surgery) without changes in vertical dimension of occlusion (VDO) (Class 3),
4. complex cases involving adjunctive therapy (endodontics, periodontics, oral surgery) with changes in VDO (Class 4), and
5. complex implant therapy cases.

Deans reported at least a 77.3% treatment rate for cases without changes in VDO. Complex implant therapy cases and cases with changes in VDO were treated by dental students at 50% and 29.5% of institutions, respectively. The results reveal that the dental students are exposed to complex prosthodontic cases with high frequency (Fig 6).

Deans reported very high incidence of new programs, which would have a tendency to increase understanding and exposure to prosthodontics. Mentoring programs (79.5%), active faculty recruitment (75%), and new science and technology (72.7%) were the top three new programs being implemented to increase exposure to prosthodontics. In addition, deans reported new prosthodontics laboratory construction (22.7%) and hiring of laboratory technicians to work with dental students (31.8%) as additional internal programs (Fig 7).

Of the deans, 68.2% felt specialties should remain the same; however, 27.3% disagreed that they should remain the same, and 29.5% of deans stated specialties should be combined. For this question, there were a total of seven no responses (Table 2, Fig 8).

The 44 respondents to the deans' survey reported that the prosthodontics department is its own entity in only 18 schools (40.9%). In 26 schools, prosthodontics is laced administratively in a larger department (Fig 9).

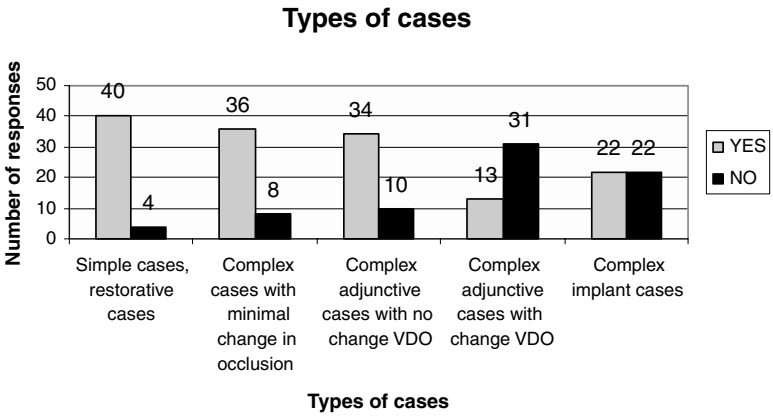

Figure 6 Number of responses to the case type.

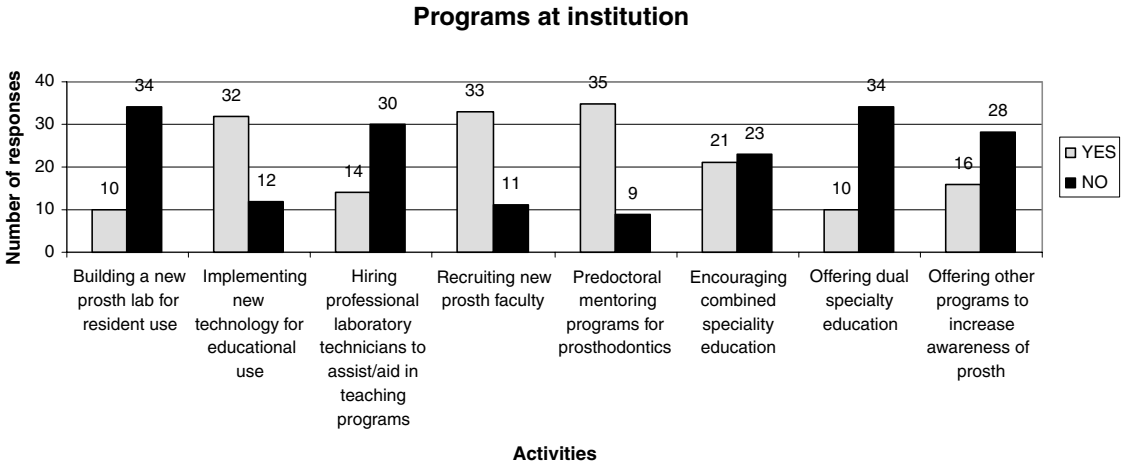

Figure 7 Number of responses to programs to enhance students' interest in prosthodontics.

Table 2 Should specialties be individual or combined

		Agree (%)	Disagree (%)	No response (%)
Question 1	Specialties should remain individual	30 (68.2)	12 (27.3)	2 (4.5)
Question 2	Specialties should be combined	13 (29.5)	26 (59.1)	5 (11.4)

Discussion

The majority of deans reported an increased interest in specialty training, which parallels the Institute of Medicine's projection of a 10% increase in specialists in the next 10 to 15 years.[5] Related to this prediction, deans reported a large increase in interest in specialty training. Sixty-six percent of deans reported either an increased interest in prosthodontics or no change during the past 5 years, as opposed to 34% who reported a decrease.

The large number of open faculty positions in prosthodontics is consistent with Haden et al's reports,[15,16] which revealed significant vacancies in prosthodontics and other areas of the clinical sciences. Of the respondents, 63.7% reported using one or multiple incentives to recruit prosthodontic faculty members.

Faculty shortages are not exclusive to prosthodontics, and it is clear there are huge demands for faculty in all aspects of dental education. As a result, predoctoral dental students often suffer in terms of faculty-to-student ratio and predoctoral exposure to specialty education and/or training. Deans were asked to rate their students' exposure to prosthodontics educators using a sliding scale, 1 through 7 (7 = highest exposure, 4 = average exposure, 1 = lowest exposure). Predoctoral students had lower exposure to postdoctoral students in prosthodontics, prosthodontists in private practice, and prosthodontists engaging in research. The deans' report of fairly good exposure to full-time faculty prosthodontists might be due to prosthodontists being more active with mentoring programs or due to prosthodontists being appointed to the predoctoral faculty. The low exposure to prosthodontic students, prosthodontist/researchers, and private practitioners could be related to a

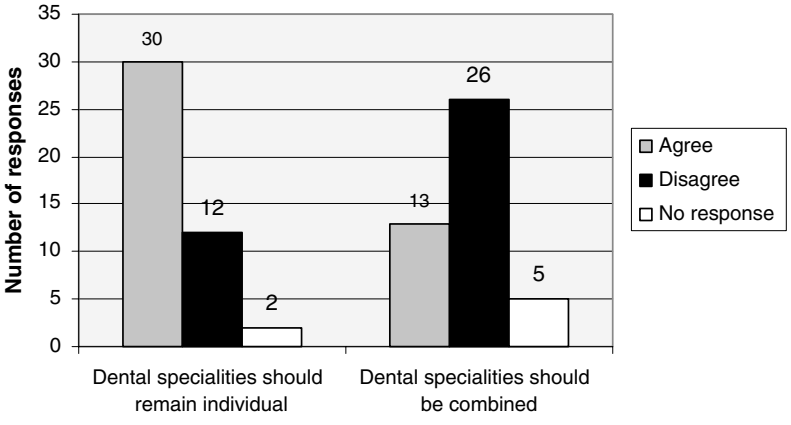

Figure 8 Number of responses regarding status of specialties.

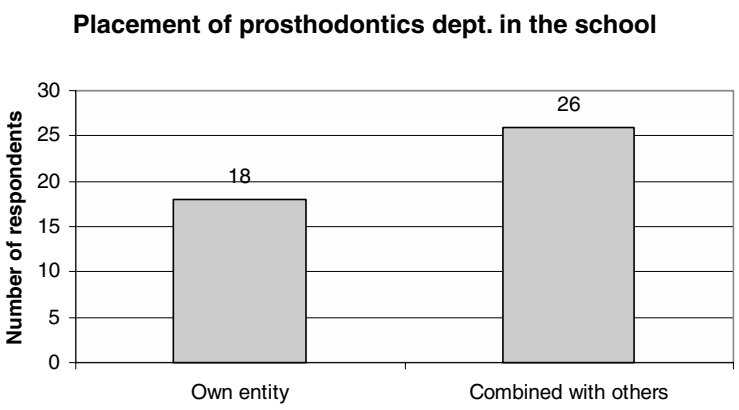

Figure 9 Number of respondents to the administrative position of prosthodontics.

lower applicant pool to prosthodontics when compared to endodontics, pediatric dentistry, oral and maxillofacial surgery, and orthodontics.

Despite limited predoctoral curriculum time pertaining to prosthodontics and faculty shortages, it appears as though dental students are still exposed to complex prosthodontic cases with high frequency. Deans reported at least a 77.3% treatment rate for cases without changes in VDO and a 23.6% treatment rate for cases with changes in VDO. Respondents reported that the predoctoral dental students treat complex implant cases in 50% of the schools.

The high frequency of complex prosthodontic cases treated at the predoctoral level correlated with other elements of the deans' survey related to prosthodontic exposure. Deans reported very high incidence of new programs to increase understanding and exposure to prosthodontics. Mentoring programs (80%), active faculty recruitment (77%), and new technology (75%) were the top three new programs being implemented to increase exposure to prosthodontics. Similarly, new prosthodontics laboratory construction (23.3%) and hiring of laboratory technicians to work with dental students (31.8%) indicates an active attempt to provide dental students more resources to provide the technological support to facilitate their prosthodontic cases.

The survey question regarding dual specialty training was intended to measure the deans' opinions on the benefit or detriment of dual programs (such as pediatric dentistry/orthodontics or prosthodontics/periodontics). The deans were invited to agree or disagree with two statements: "Should dental specialties remain individual?" and "Should dental specialties be combined?" The majority (68.2%) of the respondents agreed with the first statement and felt specialties should remain distinct entities; however, 27.3% disagreed that the specialties should remain distinct entities and 29.5% agreed that dental specialties should be combined. There were a total of seven no responses for the two questions. Therefore, it appears that the wording of this survey question was ambiguous and did not provide enough information to discuss the future structure of dental specialties as defined by the educational standards or dual specialty training.

The deans' responses to the administrative placement of prosthodontics reveal that the department of prosthodontics is its own entity in 40.9% of the dental schools reporting. At most schools, prosthodontics has been combined with other specialties or dental disciplines. Many have discussed that the loss of a department of prosthodontics might be related to a smaller applicant pool; however, at many schools, other specialties have also been merged with other specialties or dental disciplines.

Conclusion

From this survey of deans, an increased interest in specialty training was found. In addition, 66% of the deans reported a slight increase or no change in interest in prosthodontics. The number of open faculty positions remains high, and the majority of the respondents are using one or multiple incentives to recruit prosthodontists. Predoctoral students' exposure to full-time faculty in prosthodontics was reported to be much higher than exposure to postdoctoral students in prosthodontics, researchers in prosthodontics, and full-time practitioners. Using the PDI for dentate and partially dentate patients in the survey revealed that the dental students treat complex cases. Mentoring programs, faculty recruitment of prosthodontists, and new science and technology were the three top programs deans had implemented. Although many of these findings reported by deans indicate a bright future for prosthodontics, the specialty continues to have lower applicant and enrollment figures when compared to orthodontics, endodontics, oral and maxillofacial surgery, and pediatric dentistry. These lower applicant and enrollment figures are interesting when consideration is given to data on the need for prosthodontic services. A future survey of postdoctoral prosthodontics students will continue to examine trends in posthodontics.

References

1. American Dental Association: Trends in Advanced Dental Education Programs: 1991/92 to 2000/01. Chicago, IL American Dental Association, May 2002, pp. 16-17
2. American Dental Association: 2001/02 Survey of Advanced Dental Education. Chicago, IL, American Dental Association, 2002, p. 34
3. Felton DA, Goldstein G, Cooper L: Post-Graduate Resident Recruitment in Prosthodontics: Cause for Alarm, or Window of

Opportunity? Chicago, IL, ACP Messenger, Winter 2001, Vol. 32(1)
4. American Dental Association: 2002/03 Survey of Advanced Dental Education. Chicago, IL, February 2004, p. 34
5. Field M: Dental Education at the Crossroads: Challenges and Change. Washington, DC, Institute of Medicine, National Academy Press, 1995, pp. 255-256
6. Douglass CW, Watson AJ: Future needs for fixed and removable partial dentures in the United States. J Prosthet Dent 2002;87:9-14
7. United States Department of Labor, Bureau of Labor Statistics. November 2004 National Occupational Employment and Wage Estimates: Healthcare and Technical Occupations. Washington, US Department of Labor, 2004. Available from URL: www.bls.gov/oes/current/oes_29he.htm. Accessed October 11, 2005
8. Nash KD, Pfeifer DL: Private practice and the economic return for residency training as a prosthodontist. J Am Dent Assoc 2005;136:1154-1162
9. Nash KD, Pfeifer DL: Prosthodontists as a specialty private practice: Net income of private practitioners. J Prosthodont 2006;15:37-46
10. Maidment P: Forbes.com. May 2006. America's top paying jobs. Available from URL: www.forbes.com/2006/05/20/best-paying-jobs_cx_pm_06work_0523jobs.html. Accessed February 2, 2007
11. Wright RF, Dunlop RA, Kim FM, et al: A survey of program directors: Trends, challenges, and mentoring. J Prosthdont. 2007 In press. Available from URL: 10.1111/j.1532-849X. 2007. 00243.x
12. Wright R: Educators'/mentors' seminar strives to strengthen the specialty of prosthodontics. Chicago, IL, ACP Messenger, Winter 2001, Vol. 32 (1)
13. Friedman PK, Arena C, Atkinson K, et al: Report of the ADEA President's Commission on Mentoring. J Dent Educ 2004;68:390–396
14. Chiche GJ: Esthetics of Anterior Fixed Prosthodontics. Chicago, IL, Quintessence, 1994, pp. 8-9
15. Haden NK, Weaver RG, Valchovic RW: Meeting the demands for future dental school faculty: Trends, challenges, and responses. J Dent Educ 2002; 66:1102-1113
16. Haden NK, Beernstorboer PL, Weaver RG, et al: Dental school faculty shortages increase: An update on future dental school faculty. J Dent Educ 2000;64:657-673
17. McGarry TJ, Nimmo T, Skiba JF, et al: Classification for the Completely Dentate Patient. J Prosthodont 2004;13:73-82