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SWISS DENTAL JOURNAL SSO 126: 1134–1139 (2016)
Accepted for publication: 1 April 2016

Evaluation of the dental curriculum at the University of Basel

Does the Master of Dental Medicine adequately prepare for the professional practice?

KEYWORDS
alumni
survey
Bologna reform
curriculum

SUMMARY

The present study reports the results of a structured survey of graduates intending to evaluate the education at the Dental School of the University of Basel in the years from 2006 to 2014. In addition, dentists and practice owners supervising graduates from Basel in daily clinical routine or hiring them as assistant dentists were questioned. The aims of the current survey were (1) to analyze own subjective experiences, (2) to assess potential differences between the cohorts prior to and after the implementation of the Bologna reform, (3) to compare the rating regarding theoretical knowledge and practical skills, and (4) to disclose potential for improvement.

It was found that according to both their own assessment and the rating of the practice owners, graduates possess the basic dental expertise. The alumni rated their theoretical knowledge higher than their clinical practical skills and indicated a potential for intensification in the fields of dental surgery and implantology. When comparing the cohorts who had completed their studies according to the old (until 2010) and new study regulations, there were only minor differences; the own skills related to patient information about treatments were better rated by alumni who had been trained according to the new study regulations. The curriculum leading to the Master of Dental Medicine at the University of Basel fundamentally prepares graduates for the professional activity, but the additional acquisition of clinical experience in daily practice is indispensable.

Introduction

The evaluation and constant adaptation of the dental curriculum are important prerequisites to meet the prevailing needs of patients and to be able to incorporate new treatment procedures and techniques into the training (Gerbert et al. 1987). Moreover, there are framework conditions and guidelines regarding contents and structure of a university curriculum, which are registered in respective Higher Education Acts. Swiss authorities have signed the Bologna declaration in the year 1999, thereby committing themselves to structural and content-related innovations in the academic education (Weiger 2007; Michaud 2012). Thus by the year 2010 a coherent European Higher Education Area should be created with the goal to implement a two-level educational system (consisting of the bachelor and master degree) and a credit point system. These two measures should render degrees comparable and improve the mobility of the students within the European countries. The Bologna reform was refined in the subsequent years and nowadays comprises 48 countries. In parallel, the Swiss legislation on medicinal professions (MedBG), passed in 2007, required a federal final exam for all medicinal professions, which should provide for a quality assurance. This final exam has superseded the former state examination and takes place at all university locations at the same date, and under identical conditions (Zitzmann & Weiger 2011). The responsibility for the exams during the study, including the verification of the clinical skills in the various disciplines up to graduation, was officially conveyed to the faculties. Using regular accreditation processes, it is evalu-

ated by the Swiss Agency of Accreditation and Quality Assurance (AAQ, formerly QAQ).

According to the Bologna principles, a three-stage educational system was introduced in Switzerland. It consists of a three-year bachelor and a two- to three-year master study followed by a postgraduate training which provides a one-year scientific activity as the basis for the doctorate. In dental medicine the master study comprises the last two clinically oriented academic years and includes a scientific paper in the form of a master thesis. In the context of the study reform, specific core contents and learning objectives were defined for theoretical and practical courses. In addition, the imparted knowledge and acquired practical skills were examined promptly and endowed with credit points (Weiger 2007; Zitzmann & Weiger 2011). At the University of Basel, end of semester examinations were introduced for the verification of theoretical subjects. Attestation booklets in the courses served for the stepwise examination and documentation of the clinical practical skills. If the requirements of a clinical course are fulfilled, the student can report for the so-called clinical control attestation at the end of the master study. In the clinical control attestation certain treatment measures are carried out with allotted time in a clinical test situation and subsequently scored. This approach corresponds to the former practical exams in the so-called core subjects, which were carried out during the first part of the traditional state examination. The first cohort which completed its study following the curricular restructuring and passed the federal final exam could finish the training in the year 2011 (Zitzmann 2011).

The aim of the present work was to conduct an alumni survey in order to analyze the subjective assessment of the theoretical knowledge and practical skills in everyday practice as well as to find out whether there were differences between the cohorts prior to and after the implementation of the Bologna reform.

Materials and Methods

For the subjective rating of the education at the dental school of the University of Basel, an online questionnaire was sent to all alumni who graduated between 2006 and 2014. The dispatch date of the questionnaire was selected so that the final exam dated back at least six months to ensure a certain professional experience of the participants. A second questionnaire comprising various questions regarding the dental activity of the associates was sent to 48 practice owners in German-speaking Switzerland. Dental offices which had been indicated as employers by the alumni had been asked for participation provided that within the preceding ten years at least one of the employed associates had graduated in Basel (Yoon-Büchel 2015).

The questionnaires comprised personal questions as well as questions regarding various areas of activity in dental medicine. In the questionnaire of the alumni, the own competence had to be assessed with respect to both theoretical and clinical aspects. Considering the student curriculum at the University of Basel and the Swiss catalogue of learning objectives in dental medicine, the skills and competences relevant in everyday professional life were listed and grouped. Options of answers were available in the form of a matrix (gradated into "I fully agree", "I rather agree", "I rather do not agree", "I do not agree"; in the questionnaire of the practice owners and superiors there was the additional possible answer "I do not know"). For a better overview of the results, points from four (corresponding to full agreement) to one (corresponding to no agreement) were assigned to the four possible qualifying answers. Using this point grading, averages were calculated. In order to compare the scoring data prior to and after the Bologna reform, a Wilcoxon rank-sum test was performed. The error probability was set at $\alpha = 5\%$. Owing to the descriptive character of the study, no adjustment of the α-level for multiple comparisons was made. All analyses were carried out using the statistics program R version 3.1.2. (R Core Team 2014).

Results

From the total of 201 graduates contacted, 137 filled out the questionnaire, corresponding to a response rate of 68.2%. Among the respondents 58.6% were females and 41.4% males; 85% of the approached cohorts 2006–2010 and 77% of the cohorts 2011–2014 participated. Three quarters of the alumni (76.4%) indicated to be employed as an associate in a dental office. An employment at a dental university clinic was reported by 12.7% of the graduates, and 2.9% of the alumni worked independently in their own practices. Five individuals (3.6%) pursued a scientific activity without employment at the university. Another six individuals (4.4%) indicated the following: associate in a dental center, employment in a school dental clinic, self-employed in a joint practice, study of human medicine, work in aid projects (twice), travels. A majority (81.7%) of the graduates had completed or was just doing a doctorate. This information was provided by 46.7% of the alumni who had graduated before and by 35.0% of those who had graduated after the Bologna reform. Another 10.9% were planning a dissertation, whereas 7.4% did not deem this necessary or did not have time for it. For the observation period since 2006, the archive of the registrar's office revealed 45 dissertations written by alumni from the cohorts 2006–2010 (comprising a total of 115 graduates). These graduates prior to the implementation of the Bologna reform on average did their doctorate 3.5 years (1–9 years) after the state exam, although 28% had completed the thesis within a four-year period (on average after 2.4 years). From the 100 graduates who had taken their exam during the period from 2011 to 2014, i.e. in the reformed university course including a master thesis and a one-year research activity, 19 alumni to date did a doctorate and on average completed it within 2.5 years (1–4 years).

According to their own indications, the execution of the basic dental measures was mastered by the vast majority of participating alumni with full or relative agreement. This specifically applied to history taking, the correct examination of oral and extraoral structures, taking and interpreting of radiographs as well as performing a local anesthesia (Fig. 1). Similarly, the assessment of the theoretical and practical skills in the various dental fields was predominantly positive for the majority of the alumni (Fig. 2). Thus regarding the theoretical knowledge all measures except planning and placing of dental implants were positively rated by more than half of the respondents. With respect to practical skills a predominantly positive rating was given for the following: treatment of a dental emergency, adequate therapy of a dental trauma, successful collaboration with the personnel (e.g. dental assistant, dental hygienist, dental technician), compliance with hygiene measures of the practice, and the way of dealing with the psychic and physical burden of daily work. According to the notion of the interviewees, need for intensification of the training existed with respect to dental surgical interventions with extractions and osteotomies as well as regarding planning and placing of dental implants. More than half of the alumni rated positively their

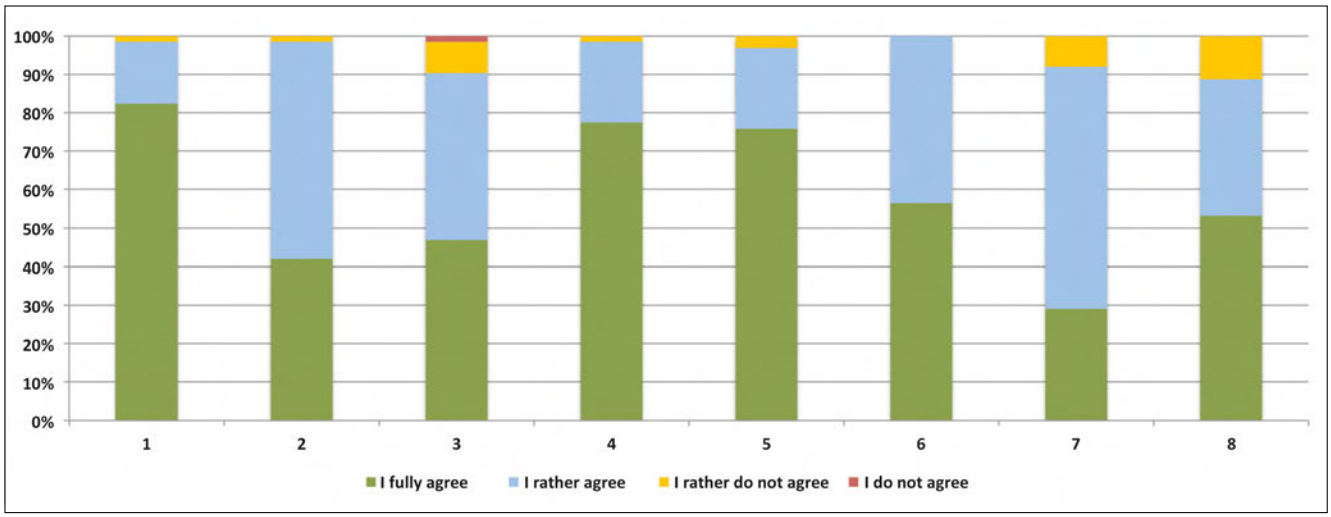

Fig. 1 Rating of fundamental knowledge (1–4) and patient communication (5–8)

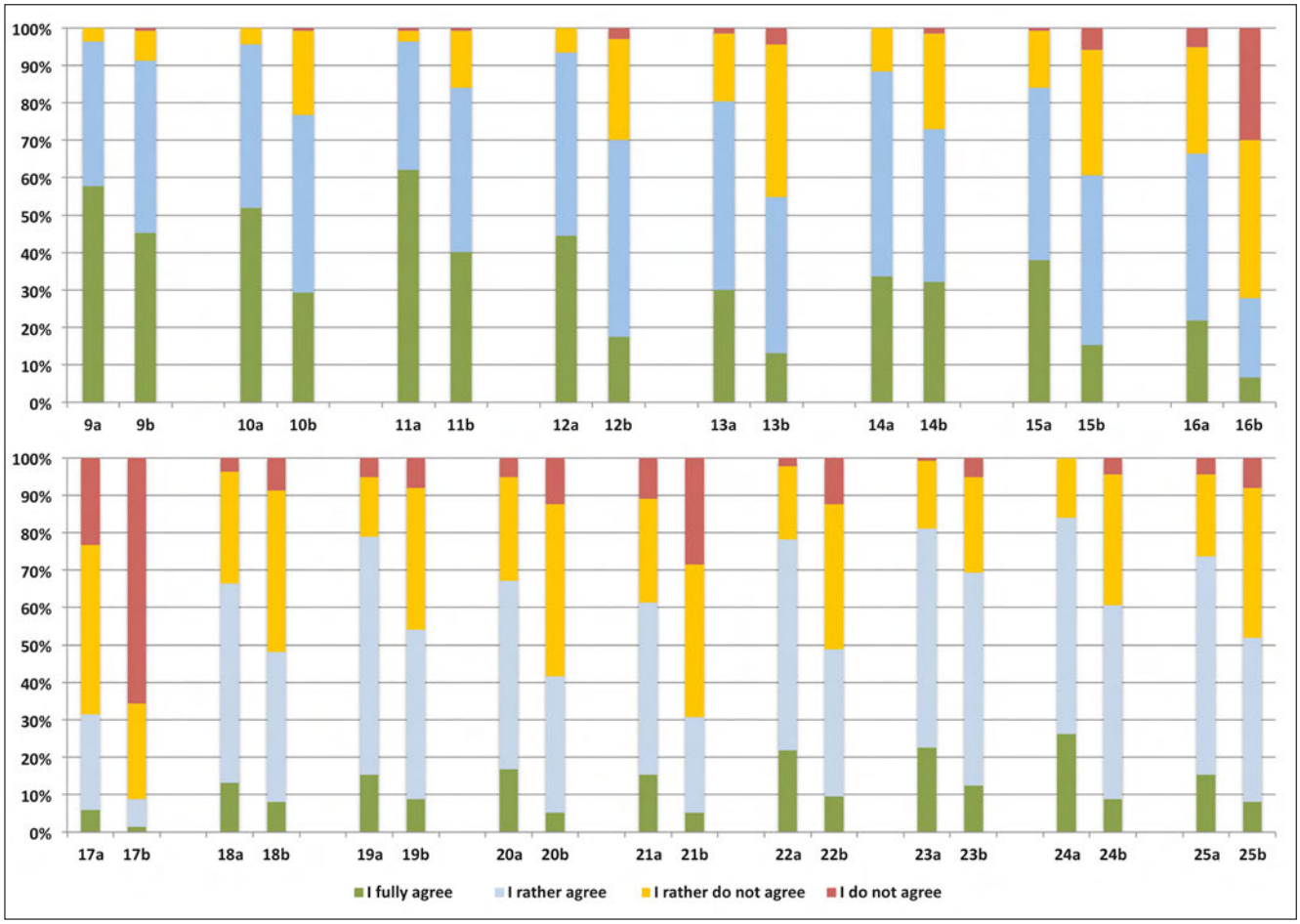

Fig. 2 Rating of clinical skills; a: theoretical, b: practical

own treatment skills in dealing with special patient groups and, for this purpose, were able to employ acquired social, communicative, and ethical competences. Counted among special patient groups in the survey were fearful patients, geriatric individuals or patients with disabilities, with psychic or psychomotor disorders, with addiction issues, or with tooth/mouth damaging behavior. On the other hand, more than half of the respondents did not feel completely qualified to adequately organize the administration (e.g. dealing with accounting, the tariff system, insurances, agencies, etc.) (Fig. 3). The comparison of the theoretical and practical assessment by the alumni revealed better rating of the theoretical skills regarding all aspects listed ($p<0.0001$).

The analysis of averages across the four response options revealed only small differences between the graduation cohorts before and after the Bologna reform (Tab. I). A better rating ($p<0.05$) was given by the graduates of the years 2011–2014 regarding the skills in patient information and treatment plan-

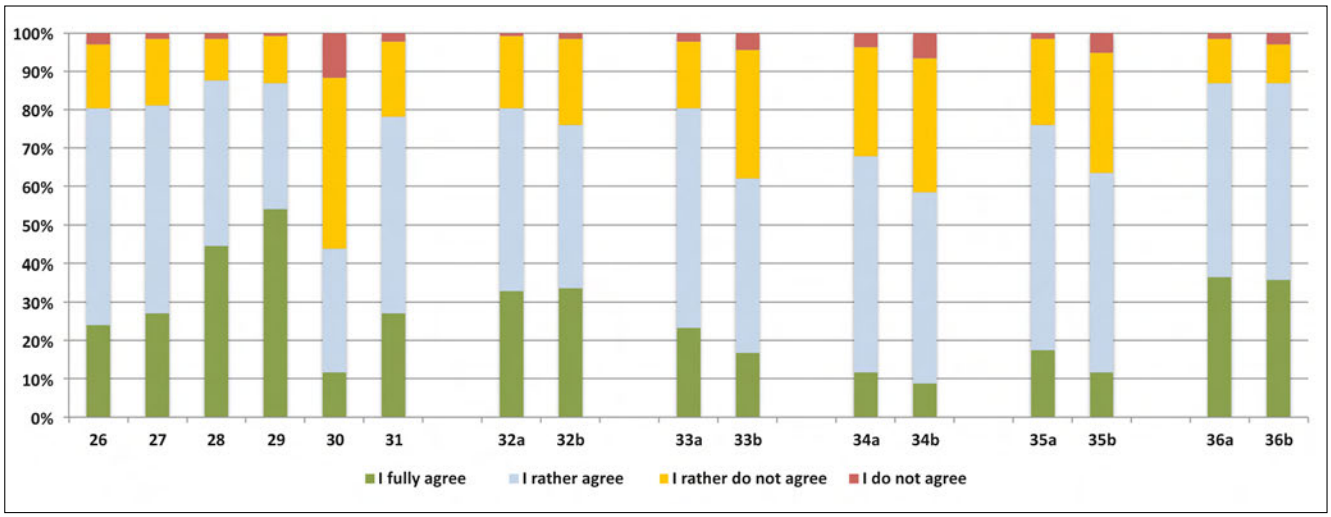

Fig. 3 Rating of the scientific competence, practice management, and special aspects; a: theoretical, b: practical

ning as well as in root canal treatment (theoretical) and orthodontic diagnostics (practical).

As far as practice owners were concerned, the response rate amounted to 62.5% (30 responses from 48 approached practice owners). The assessment of the graduates' skills in the various dental fields was largely positive for the majority of practice owners. Thus 83.3% indicated that the graduates mastered the dental basics (history taking, examination, radiography, local anesthesia), and 76.7% of practice owners positively rated the skills related to the usage of social, communicative, and ethical competences. Similarly, it was largely affirmed that caries, as well as endodontic and periodontal diseases could be competently treated by the graduates (76.7%). In agreement with the alumni, need of intensification in the fields of surgery and implantology as well as in orthodontic diagnostics and pedodontic treatment was also mentioned by the practice owners (Tab. II).

In a free text box provided for comments, 21 practice owners (70.0%) emphasized the good theoretical knowledge and partly minor practical experience, especially in the field of dental surgery. As a proposal for optimization, practice owners suggested practical courses in private dental offices, which for example could be implemented in the recess time of the students.

Discussion

The data of the present survey from both the alumni and the interviewed dentists or practice owners show that irrespective of the implementation of the reforms in the context of the Bologna process, the dental curriculum at the University of Basel adequately imparts the essentials for the later professional activity on the basis of the Swiss catalogue of learning objectives. However, more clinical experience especially in the field of dental surgery is deemed desirable. It must be noted that between this form of subjective self-assessment of own skills and the evaluation by professionals a discrepancy may exist, as has been shown in a study of student work (Nance et al. 2009). Similarly, in the case of practice owners who had agreed to participate, a basic interest or positive attitude and hence a possible bias could be assumed. Nevertheless, the analysis of the dental curriculum using regular feedback of the alumni and practice owners plays an important role, because strengths and deficits can be recognized, thus allowing for a continuous optimization of the curriculum (Kaiser & Kiessling 2010).

Notwithstanding the positive structural and content-related alterations which were incorporated into the dental curriculum concomitantly with the academic reform, the possibility of a university change is still utilized only at the postgraduate level. The introduction of the master thesis promotes the scientific education and emphasizes the academic character of the university dental training (Weiger 2007). However, the data of the present work indicate that the number of doctorate degrees tends to decrease. This could be due to the increased requirements for the dissertation, which imply a one-year scientific activity.

Although the federal diploma provides the professional qualification, the independent practice management and accomplishment of difficult or even complex treatments cannot be fully expected from a graduate (Weiger 2007). Considering the predetermined timeframe of five academic years, it is most of all necessary to be capable of applying the growing diagnostic and therapeutic possibilities of dental medicine ("specialization"). At the same time, the increased requirements regarding general medical knowledge (e.g. oral health) should be met. Similarly, the academic scientific education remains an essential component of every university curriculum. When exclusively considering practical skills, the significance of this scientific education for future developments and progress in dental medicine is occasionally ignored. The increase in complexity of the dental curriculum is responsible for the fact that a general professional qualification with regard to a later practice activity constitutes the focus of the student training. This general professional qualification also includes appropriate basic knowledge in dental surgery. However, the clinical training in dental implantology is primarily reserved for the advanced postgraduate education.

Conclusion

In summary, the master study of dental medicine at the University of Basel horoughly prepares graduates for the professional activity and accounts the Swiss catalogue of learning objectives. In the present work need of further improvement of practical experience, particularly in the field of dental surgery, could be identified.

Acknowledgment

The authors thank Dr. Nicolas Lienert for the computer technical support in the preparation of the questionnaire.

Tab. I Mean rating of alumni who graduated prior to and after the Bologna reform (four response options: 4 I fully agree, 3 I rather agree, 2 I rather do not agree, 1 I do not agree)

"After the final exam I was capable ..."	2006–2010 n=75		2011–2014 n=62		p-value
1. ... to take a complete medical and dental history.	3.7		3.8		0.37
2. ... to perform a correct examination of oral and extraoral structures.	3.4		3.4		0.60
3. ... to take and interpret radiographs.	3.3		3.4		0.52
4. ... to correctly and effectively perform a local anesthesia.	3.7		3.8		0.46
5. ... to inform patients about preventive measures such as oral hygiene and eating behavior.	3.7		3.7		0.93
6. ... to inform patients about the possible treatment steps.	3.3		3.6		0.03
7. ... to establish a treatment plan.	3.0		3.2		0.04
8. ... to recognize the necessity of a referral to a specialist.	3.4		3.4		0.49
	theo-retical	practi-cal	theo-retical	practi-cal	p-values theo/prac
9. ... to recognize and treat caries.	3.5	3.3	3.6	3.4	0.15/0.25
10. ... to recognize and treat endodontic diseases.	3.4	3.0	3.6	3.1	0.03/0.72
11. ... to recognize and treat periodontal diseases.	3.6	3.2	3.6	3.3	0.65/0.67
12. ... to plan and manufacture a full denture.	3.3	2.8	3.5	2.9	0.12/0.44
13. ... to plan and manufacture a removable partial denture.	3.0	2.6	3.2	2.7	0.28/0.64
14. ... to perform rebasing and repairs.	3.2	3.0	3.3	3.1	0.54/0.17
15. ... to plan and perform crown and bridge treatments.	3.2	2.6	3.3	2.8	0.59/0.30
16. ... to perform dental-surgical interventions including extractions and osteotomies.	2.9	2.0	2.8	2.1	0.78/0.94
17. ... to plan and place implants.	2.1	1.4	2.1	1.5	0.94/0.38
18. ... to recognize oral mucosal lesions.	2.7	2.4	2.8	2.5	0.87/0.29
19. ... to recognize and treat myofascial pain/TMJ dysfunction.	2.8	2.5	3.0	2.6	0.42/0.26
20. ... to recognize and treat malocclusion.	2.8	2.4	2.7	2.3	0.34/0.48
21. ... to carry out orthodontic diagnostics.	2.6	1.9	2.7	2.3	0.61/0.01
22. ... to perform pedodontic treatments.	2.9	2.5	3.0	2.4	0.44/0.27
23. ... to adequately treat a dental emergency case.	3.0	2.7	3.0	2.8	0.32/0.24
24. ... to correctly treat a dental trauma.	3.1	2.6	3.1	2.7	0.90/0.83
25. ... to adequately treat a general medical emergency.	2.9	2.6	2.8	2.5	0.31/0.47
26. ... to critically evaluate professional articles/publications.	2.9		3.0		0.33
27. ... to critically assess specialist advertising.	3.0		3.1		0.30
28. ... to successfully cooperate with collaborators (e.g. dental technician, dental assistant, dental hygienist).	3.3		3.4		0.66
29. ... to understand and adhere to hygiene measures of the practice.	3.3		3.5		0.24
30. ... to organize the administration (dealing with accounting, tariff system, insurances, agencies, etc.).	2.3		2.5		0.11
31. ... to deal with the psychic and physical burden of daily work (rather than to transfer it to collaborators and patients).	3.0		3.1		0.47
32. ... to deal with anxiety patients.	3.1	3.0	3.2	3.1	0.33/0.36
33. ... to treat geriatric and disabled patients.	3.0	2.8	3.0	2.7	0.96/0.25
34. ... to treat patients with psychic or psychomotor disorders.	2.7	2.6	2.8	2.6	0.73/0.90
35. ... to treat patients with addiction issues or tooth/mouth damaging behavior.	2.9	2.7	2.9	2.7	0.66/0.99
36. ... to apply social, communicative, and ethical competences.	3.1	3.1	3.2	3.2	0.08/0.19

Tab. II Mean rating of practice owners or employers
(five response options: 4 I fully agree, 3 I rather agree, 2 I rather do not agree, 1 I do not agree, 0 I do not know)

"After the final exam at the University of Basel my graduate was capable ..." (n=30)	Means
1. ... to master the basics such as medical and dental history, examination, taking and interpretation of radiographs, and execution of a local anesthesia.	3.3
2. ... to master the communication with patients such as information about preventive measures, explanation of treatment steps, establishment of a treatment plan, and recognizing the necessity of a referral to a specialist.	2.9
3. ... to treat caries, endodontic, and periodontal diseases.	2.9
4. ... to perform prosthetic work such as full dentures, removable dentures, crown and bridge treatments.	2.0
5. ... to perform rebasing and repairs.	2.4
6. ... to perform dental-surgical interventions including extractions and osteotomies.	1.7
7. ... to plan and place implants.	1.4
8. ... to recognize oral mucosal lesions.	2.5
9. ... to recognize and treat myofascial/TMJ dysfunctions and malocclusion.	2.1
10. ... to carry out orthodontic diagnostics and pedodontic treatments.	1.9
11. ... to adequately treat a dental emergency and a dental trauma.	2.5
12. ... to adequately treat a general medical emergency.	2.3
13. ... to critically evaluate professional articles/publications.	2.5
14. ... to master the practice management including cooperation with collaborators (e.g. dental technician, DA, DH), hygiene measures of the practice, administration (dealing with accounting, the tariff system, insurances, agencies, etc.) as well as dealing with psychic and physical burdens.	2.3
15. ... to deal with anxiety patients and to treat geriatric or disabled patients, patients with psychic or psychomotor disorders, with addiction issues, or with tooth/mouth damaging behavior.	2.6
16. ... to apply social, communicative, and ethical competences.	3.0

Résumé

La présente étude informe des résultats obtenus grâce à une enquête structurée auprès des diplômés au sujet de l'évaluation de la formation en médecine dentaire à la Faculté médicale de l'Université de Bâle (2006–2014). De plus, les dentistes dans les cabinets dentaires ainsi que dans les cliniques universitaires ont été questionnés. Le but de l'étude était de démontrer les différences entre les diplômés avant et après l'introduction de la réforme de Bologne concernant le savoir théorique et pratique ainsi que de découvrir le potentiel d'amélioration.

Les employeurs et les diplômés sont du même avis en ce qui concerne les compétences dentaires de base existantes. Les alumnis ont estimé leur connaissances théoriques supérieures aux connaissances pratiques, mais la formation en chirurgie dentaire et en implantologie devrait être intensifiée. En comparant les cohortes d'après l'ancien (jusqu'en 2010) et le nouveau règlement d'étude, les différences étaient insignifiantes. La capacité d'informer les patients sur la thérapie a été évaluée supérieure parmis les diplômés du nouveau règlement.

Le Master en médecine dentaire à l'Université de Bâle prépare les diplômés fondamentalement à l'activité professionnelle, en spécifiant que l'expérience clinique devrait être acquise dans la pratique quotidienne.

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