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CONSENSUS REPORT

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Consensus report of the second European Consensus Workshop on Education in Periodontology

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Abstract

Background: The second European Consensus Workshop on Education in Periodontology was commissioned, as a result of the changes in the discipline and the advances in educational methods/technology, to update the 2009 Consensus report of the first European Federation of Periodontology (EFP) Workshop on the same topic that was jointly authored by the Association for Dental Education in Europe.

Aim: To identify and propose changes necessary in periodontal education at three levels, namely undergraduate, specialist and continuing professional development (CPD), with respect to learning outcomes, competencies and methods of learning/training and evaluation.

Methods: Four working groups (WGs) considered education in periodontology at the undergraduate, specialist and CPD levels, and education methods. Four commissioned position papers, one per WG, summarized the relevant information. Workshop participants gathered at an in-person consensus meeting to discuss the individual reviews, and this consensus report summarizes the conclusions.

Results: The learning outcomes for undergraduate and specialist education in periodontology have been updated, and a proposal for learning outcomes for CPD programmes was made. Learning/teaching/training and evaluation methods were proposed for each level of education, which included face-to-face, virtual and blended learning methods.

Conclusion: Developments in oral/dental medicine and in contemporary educational technologies have been translated into updated learning outcomes and learning/teaching/ training/evaluation methods relevant to education in periodontology.

KEYWORDS
education, Europe, periodontology, specialist, undergraduate

*A complete list of EFP workshop participants appears in the Appendix.

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Clinical Relevance

Scientific rationale for study: There is a need to update recommendations related to education in periodontology, originally developed by the first European Federation of Periodontology Workshop in 2009.

Principal findings: Learning outcomes in undergraduate and specialist education have been updated, and a structured proposal was made for continuing professional development. Learning/ teaching/training/evaluation methods have evolved as a result of developments in oral/dental medicine, new technologies and the impact the COVID-19 pandemic.

Practical implications: Universities and other providers of education in periodontology should consider updating their programmes in terms of learning outcomes and learning/teaching/training/evaluation methods.

1 | INTRODUCTION

The first European Consensus Workshop on Periodontal Education was organized by the European Federation of Periodontology (EFP), in collaboration with the Association for Dental Education in Europe (ADEE). The in-person consensus meeting took place in La Granja de San Ildefonso (Segovia, Spain), during 18–20 November 2009, and the resulting materials were published in 2010 (Baehni et al., 2010; Chapple et al., 2010; Konig et al., 2010; Mattheos et al., 2010; Sanz & Chapple, 2010; Sanz & Meyle, 2010; Van der Velden & Sanz, 2010). During the 2009 Workshop, over 60 experts discussed various aspects of teaching and learning in periodontology at the undergraduate, specialist and continuing professional development (CPD) levels.

Almost 15 years later, it was timely to conduct a second European Consensus Workshop on Education in Periodontology, under the umbrella of the European Workshops on Periodontology (19th European Workshop on Periodontology). This appears pertinent for two reasons: (i) to appreciate the impact of the 2009 Workshop in the education in periodontology in Europe (Gursoy et al., 2018), and (ii) to examine the need for changes in education in periodontology at all levels since then, because of developments in oral sciences, patient care and relevant educational technologies.

1.1 | Changes in education

Education, in general, has been severely impacted by the COVID-19 pandemic (Farrokhi et al., 2021; Iyer et al., 2020), which led to an acceleration in the development and use of new technologies, including virtual and blended learning methods (Coughlan et al., 2022; Di Carvalho Melo et al., 2023).

1.2 | Changes in dental education

Dental education has also undergone significant changes. ADEE proposed a curriculum framework, first published in 2005 (Plasschaert et al., 2005) and later updated in 2009 (Cowpe et al., 2010). Seven domains were proposed, and these were further modified by EFP, which reflected in the publication outlining the competencies in periodontology for the undergraduate dental student (Sanz & Meyle, 2010). Those domains were as follows: domain I, professionalism; domain II, interpersonal communication and social skills; domain III, knowledge base, information and information literacy; domain IV, clinical information gathering; domain V, diagnosis and treatment planning; domain VI, therapy: establishing and maintaining oral health; and domain VII, prevention and health promotion. In 2017, ADEE published a new undergraduate curriculum framework for the Graduating European Dentist (Field, Cowpe, & Walmsley, 2017), which identified four domains: domain I, professionalism (McLoughlin et al., 2017); domain II, safe and effective clinical practice (Field, DeLap, & Manzanares Cespedes, 2017); domain III, patient-centred care (Field, Kavadella, et al., 2017); and domain IV, dentistry in society (Gallagher & Field, 2017).

Another important document was from the 75th World Health Assembly of the World Health Organization (WHO), covering oral health training (World Health Organization, 2022). In an introductory section titled *Global Overview of Oral Health*, *An Overview of Oral Healthcare Systems* was presented, and important limitations were described including statements such as 'oral health training is rarely integrated in general health education systems', and 'training focuses on educating highly specialized dentists rather than mid-level and community oral health workers, or optimizing the roles of the wider health team'. Six guiding principles were listed (Table 1) and within principle 3, a clear recommendation (article 26) was made for education: 'resource and workforce planning models need to better align the education and training of health workers with public health goals and population-level oral health needs, particularly for underserved populations'. In addition, six strategic objectives (SOs) were presented (Table 1), all including statements about the importance of education. SO1 (oral health governance) stated that 'increased political and resource commitment to oral health are vital at national and subnational levels, as is the reform of health and education systems' (article 30). SO2 (oral health promotion and oral disease prevention) stated that 'SO2 calls for evidence-based, cost-effective and sustainable interventions to promote oral health and prevent oral diseases and conditions' (article 33). However, the crucial SO for dental education and the health workforce (SO3), aimed primarily 'to revise and

TABLE 1 Summary of the most relevant articles for dental education, extracted from the document 'Follow-up to the political declaration of the third high-level meeting of the General Assembly on the prevention and control of non-communicable disease', presented at the 75th World Health Assembly of the World Health Organization (WHO) (World Health Organization, 2022).

Section	Selected articles
Global overview of oral health	
Oral healthcare systems	
	19. In many countries, insufficient attention is given to planning the health workforce to address the population's oral health needs. Oral health training is rarely integrated in general health education systems. Typically, training focuses on educating highly specialized dentists rather than mid-level and community oral health workers or optimizing the roles of the wider health team.
Vision, goal and guiding principles	
Guiding principles	
Principle 1: A public health approach to oral health	
Principle 2: Integration of oral health in primary health care (PHC)	
Principle 3: Innovative workforce models to respond to population needs for oral health	
	26. Resource and workforce planning models need to better align the education and training of health workers with public health goals and population oral health needs, particularly for underserved populations. Universal health coverage (UHC) can only be achieved by reforming health, education and resource planning systems to ensure that the health workforce has the needed competencies to provide essential oral healthcare services across the continuum of care. This may require reassessing the roles and responsibilities of mid-level and community-based health workers and other relevant health professionals that include the oral health sector. The new WHO Global Competency Framework for Universal Health Coverage should guide the development of health workforce models for oral health.
Principle 4: People-centred oral health care	
Principle 5: Tailored oral health interventions across the life course	
Principle 6: Optimizing digital technologies for oral health	
Strategic objectives	
Strategic objective 1: Oral health governance: Improve political and resource commitment to oral health, strengthen leadership and create win-win partnerships within and outside the health sector	
	30. Strategic objective 1 seeks the recognition and integration of oral health in all relevant policies and public health programmes as part of the broader national non-communicable diseases (NCD) and UHC agendas. Increased political and resource commitment to oral health is vital at the national and sub-national levels, as is the reform of health and education systems. Ideally, this would include a guaranteed minimum share of public health expenditure that is directed exclusively to national oral health programmes.
Strategic objective 2: Oral health promotion and oral disease prevention: Enable all people to achieve the best possible oral health and address the social and commercial determinants and risk factors of oral diseases and conditions	
	33. Strategic objective 2 calls for evidence-based, cost-effective and sustainable interventions to promote oral health and prevent oral diseases and conditions. At the downstream level, oral health education supports the development of personal, social and political skills that enable all people to achieve their full potential for oral health self-care. At the upstream level, oral health promotion includes creating public policies and fostering community action to improve people's control over their oral health and to promote oral health equity.
Strategic objective 3: Health workforce: Develop innovative workforce models and revise and expand competency-based education to respond to population oral health needs	
	35. Strategic objective 3 aims to ensure that there is an adequate number, availability and distribution of skilled health workers to deliver an essential package of oral health services to meet population needs. This requires that the planning and prioritization of oral health services be explicitly included in all costed health workforce strategies and investment plans.
	36. More effective workforce models will likely involve a new mix of dentists, mid-level oral health care providers (such as dental assistants, dental nurses, dental prosthetists, dental therapists and dental hygienists), community-based health workers and other relevant health professionals who have not traditionally been involved in oral healthcare, such as primary care physicians and nurses. Implementing such models may require reassessing and updating national legislative and regulatory policies for the licensing and accreditation of the health workforce. Health educators will be key stakeholders in establishing competency and professionalism standards for oral health to guide and assess the education, training and practice of an innovative health workforce.

(Continues)

TABLE 1 (Continued)

Section	Selected articles
	37. Curricula and training programmes need to adequately prepare health workers to manage and respond to the public health aspects of oral health and address the environmental impact of oral health services on planetary health. Professional oral health education must go beyond development of a clinical skill set to include robust training in health promotion and disease prevention and key competencies, such as evidence-informed decision making, reflective learning about the quality of oral healthcare, inter-professional communication and the provision of people-centred health care. Intra- and inter-professional education and collaborative practice will also be important to allow the full integration of oral health services in health systems and at the primary care level.
Strategic objective 4: Oral health care: Integrate essential oral health care and ensure related financial protection and essential supplies in PHC	
Strategic objective 5: Oral health information systems: Enhance surveillance and health information systems to provide timely and relevant feedback on oral health to decision makers for evidence-based policy-making	
Strategic objective 6: Oral health research agendas: Create and continuously update context and needs-specific research that is focused on the public health aspects of oral health	
Role of who, member states and partners	
Member States	
	56. Member States should also assess and reorient the health workforce as required to meet population oral health needs by reorienting the outcomes of the education programmes to the oral health services to be provided. This requires enabling inter-professional education and collaborative practice that involves mid-level and community-based health workers. They should critically review and continuously update their oral health education content across health worker training programmes and training curricula, prioritizing a public health approach to oral health that enables health workers to develop essential competencies such as reflective problem solving and leadership skills.

expand competency-based education to respond to population oral health needs', and the need for 'an adequate number, availability and distribution of skilled health workers to deliver an essential package of oral health services to meet population needs' (article 35), and of 'more effective workforce models' was highlighted. In additional statements, educators were considered 'key stakeholders in establishing competency and professionalism standards for oral health to guide and assess the education, training and practice of an innovative health workforce' (article 36), and 'curricula and training programmes need to adequately prepare health workers to manage and respond to the public health aspects of oral health (article 37)'.

A final message was addressed to the Member States, who 'should also assess and reorient the health workforce as required to meet population oral health needs by reorienting the outcomes of the education programmes to the oral health services to be provided. […] and continuously update their oral health education content across health worker training programmes and training curricula' (article 56) (World Health Organization, 2022).

1.3 | Changes in education in periodontology

In periodontal science and practice, relevant changes are also evident, including the publication of the 2018 classification of periodontal and peri-implant diseases and conditions (Caton et al., 2018), or the development and publication of the EFP clinical practice guidelines (CPGs) for the treatment of periodontitis in stages I–III (Sanz et al., 2020) and in stage IV (Herrera et al., 2022), and for the prevention and treatment of peri-implant diseases (Herrera et al., 2023). In addition, accumulating evidence, clinical trials and summaries in systematic reviews with meta-analysis allow improved precision in establishing efficacy, and in some cases, evidence of cost effectiveness is emerging.

2 | OBJECTIVES

The present second European Consensus Workshop on Education in Periodontology and the 19th European Workshop on Periodontology 'Education in Periodontology in Europe' aimed to identify and propose the necessary changes in education in periodontology at all levels (undergraduate, specialist, CPD), relevant to learning outcomes and competencies, and to methods of learning/teaching/training and evaluation.

3 | METHODS

The project commenced in February 2023 (Table 2) and was led by an organizing committee composed of the members of the European Workshop Committee of the EFP. The list of workshop participants included the organizing committee (9 persons) and the responsible reviewers (15), together with 3 stakeholders representing the EFP, 4 consultants representing ADEE, 4 observers representing the sponsor and 46 invited experts, totalling 70 participants, from 21 different countries (see Photograph 1).

Four working groups (WGs) were designed to address specific aspects of the workshop; each WG initially included three reviews

TABLE 2 Outline of the second European Consensus Workshop on Education in Periodontology.

February 2023	• Decision on and invitation of topics and reviewers. • Invitations sent to reviewers. • Discussion with reviewers to align reviews within each working group.
March 2023	• 31 March 2023, deadline for submission of protocols for initial validation, including objectives, co-authors and methodology and assessment by the working group chairs.
April 2023	• Decision on and invitation of participants. • Invitations sent to participants.
July 2023	• 31 July 2023, deadline for draft paper submission to working group chairs, for assessment of consistency among reviews.
August 2023	• 31 August2023, deadline for paper submission to the *Journal of Clinical Periodontology*, for conventional peer-review process.
September–December 2023	• Peer review process for reviews in the *Journal of Clinical Periodontology*.
October 2023	• On-line preparatory meeting (1–2 h). • Deadline for submission of conflict-of-interest forms. • Electronic circulation of reviews drafts.
November 2023	• The 19th European Workshop of Periodontology took place at the Parador de la Granja (Segovia, Spain) 5–8 November 2023.
December 2023–March 2024	• Preparation of final documents, submissions to the *Journal of Clinical Periodontology*. • Peer review process for consensus report in the *Journal of Clinical Periodontology*.
April–May 2024	• Expected final publication as special issue in the *Journal of Clinical Periodontology*.

that were ultimately merged into a single publication per WG and which provided the bases for the subsequent discussions and consensus (Table 3).

3.1 | Working Group 1 (WG1): Undergraduate dental education in periodontology in Europe

WG1, chaired by Søren Jepsen and Mariano Sanz (Table 4a and Photograph 2a), reviewed the impact of the 2009 Workshop on undergraduate education in periodontology and how its recommendations have evolved in the last 15 years. The focus of this WG was to explore the list of learning outcomes and competencies in periodontology at the undergraduate level. Primarily, this involved discussion around the ADEE Graduating European Dentist (GED) domains (Field, Cowpe, & Walmsley, 2017) and incorporating the 2018 classification of periodontal and peri-implant diseases and conditions (Caton et al., 2018), as well as the CPGs for the treatment of periodontitis and peri-implant diseases (Herrera et al., 2022, 2023; Sanz et al., 2020). In addition, the newly proposed GED curriculum domains were used as a guide to update the 2009 EFP curriculum in Periodontology (Field, Cowpe, & Walmsley, 2017). Another task of this working group was to discuss the appropriate learning and evaluation methods for the graduate in dentistry. Three reviews were commissioned to Mervi Gursoy and Asaf Wilensky; Elena Figuero and Mariano Sanz; and Virginie Monnet–Corti and Peter Eickholz, and their findings were consolidated in a composite paper (Figuero et al., 2024).

3.2 | Working Group 2 (WG2): Specialist training in periodontology

WG2, chaired by Tord Berglundh and Maurizio Tonetti (Table 4b and Photograph 2b), dealt with specialist training, or equivalent, depending on the specific regulations applicable to individual countries. The experiences of the EFP-accredited programmes were crucial in the development of these recommendations. Ad hoc surveys were designed and administered to programme directors and EFP-accredited programme graduates to solicit relevant perspectives. Three individual reviews were commissioned to Moshe Goldstein, Nikolaos Donos and Wim Teughels (Goldstein et al., 2024).

3.3 | Working Group 3 (WG3): CPD and vocational education and training

WG3, chaired by Moritz Kebschull and Anton Sculean (Table 4c and Photograph 2c), focused on CPD and VET, a field currently undergoing continuous change with respect to format and content, in response to market demand and legal regulations. Three reviews were commissioned, led by Jörg Meyle, Lewis Winning and France Lambert (Meyle et al., 2024).

3.4 | Working Group 4 (WG4): Education methods

WG4, chaired by Iain Chapple and David Herrera (Table 4d and Photograph 2d), focused on education methods involved in periodontology, but also derived information from similar methodologies applied in general dentistry and medicine. These included methods of delivery and assessment of knowledge and skills applicable to undergraduate, specialist and CPD levels. The primary aim of this group was to examine which approach (face-to-face, hybrid/blended, remote/virtual) the literature suggests is most effective for each education level; the secondary aim was to explore which specific education methods, within each approach, could be usefully recommended as educational tools. Three reviews were commissioned, directed by Bruno Loos, Christoph Ramseier and Philip Preshaw (Preshaw et al., 2024).

PHOTOGRAPH 1 Workshop participants during the in-person meeting in La Granja de San Ildefonso, Segovia, Spain.

4 | WG 1: UNDERGRADUATE DENTAL EDUCATION IN PERIODONTOLOGY IN EUROPE

4.1 | Preamble: Concepts of modern undergraduate oral healthcare professional education

Several definitions are proposed based on the Articulate Glossary created by the Association of Dental Education in Europe (ADEE) (Davies et al., 2023) and available at https://o-health-edu.org/articulate.

Competence or *competency* is defined as 'professional behaviours or skill required by a graduating Oral Healthcare Professional (OHP) in order to respond to the full range of circumstances encountered within their professional practice' (Davies et al., 2023). In more detail, competence in OHP education has also been defined as the integration of knowledge, skills, values and attitudes necessary for safe and ethical professional practice, able to be applied in real-world contexts. Competence is, therefore, multi-dimensional and dynamic, changing with time, experience and setting. Consequently, *competence profiles* in OHP education need to be validated by the changes in clinical practice and the evolving nature of oral health professionals and their required competencies (Cowpe et al., 2010).

Competence-based education in OHP education focuses on those curriculum components that are shaped by societal needs and economic realities, and which provide a blueprint for the undergraduate OHP curricula.

Different from competence-based education, *outcome-based education* is based on what is important for students to know, understand and or be able to demonstrate, which is defined by the learning outcomes.

Learning outcomes are 'a series of individual and objective outcomes, with shared ownership between students and staff, designed to facilitate the learning and assessment process' (Davies et al., 2023).

Therefore, learning outcomes are the end result of the learning process and describe what students are expected to know, understand or be able to do at the end of a course or programme. At the same time, they guide the teaching, learning and assessment processes, as well as the curriculum design.

In outcome-based curricula, however, the assessment of essential skills such as critical thinking, reflection, empathy and self-directed learning may be difficult because it mainly focuses on the external locus of control, rather than in the intrinsic development of the graduate as a holistic professional.

Learning outcomes should be written as broad statements that encompass what is achieved and assessed by the student at the end of a course, thus representing actual achievements and assessments rather than just aspirations or intentions. They should be comprehensive, practical and adaptable to different contexts and disciplines, having the potential to facilitate a comparison between different training programmes. They also provide a reference point for quality assurance and serve as the basis for curriculum design or re-development. Their taxonomy is an important aspect of university education, as it

TABLE 3 Working groups (WGs) with their chairs and the review papers with their authors.

WG	WG chairs	Review title	Review reference	Responsible author/s	Section title
WG1	Sören Jepsen, Mariano Sanz	Domains, Competences and Learning Outcomes for Undergraduate Education in Periodontology	Figuero et al. (2024)	Mervi Gursoy, Asaf Wilensky	Domains I, II and IV
				Elena Figuero, Mariano Sanz	Periodontal health and diseases information related to Domain III
				Virginie Monnet-Corti, Peter Eickholz	Peri-implant-disease-related information in Domain III
WG2	Tord Berglundh, Maurizio Tonetti	Structure, Governance and Delivery of Specialist Training Programs in Periodontology and Implant Dentistry	Goldstein et al. (2024)	Moshe Goldstein	Postgraduate/specialist training in periodontology: Competences and learning outcomes
				Nikolaos Donos	Educational methods, evaluation of competences/ learning outcomes and educational quality assurance in postgraduate/specialist training in periodontology
				Wim Teughels	Implementation and Impact of the 2018 Classification and the EFP Clinical Practice Guidelines on Specialist Training in Periodontology
WG3	Moritz Kebschull, Anton Sculean	Continuing Professional Development and Vocational Education and Training in Periodontology and Implant Dentistry	Meyle et al. (2024)	Joerg Meyle	Vocational Education and Training in Periodontology in Europe
				Lewis Winning	Continuing professional development: Impacts of the 2018 Classification and Clinical Practice Guidelines.
				France Lambert	Addressing peri-implant health and the management of peri-implant diseases during continuing professional development: A scoping review
WG4	Iain Chapple, David Herrera	Contemporary Educational Methods in Periodontology	Preshaw et al. (2024)	Bruno Loos	A scoping review evaluating traditional face-to-face teaching methods and the move to student-centred methods in periodontology
				Christoph Ramseier	The impact and feasibility of virtual methods and programmes of educational provision in undergraduate, postgraduate and continuing education in periodontology: A scoping review
				Philip Preshaw	Blended teaching and learning in periodontal education

provides a framework for designing course contents and assessment processes, as well as for measuring student attainment.

Learning outcome taxonomy should provide a common vocabulary to ensure that they are clear, observable and measurable and that they contain the three domains of learning: cognitive, affective, and psychomotor. This taxonomy should consist of a list of active verbs that describe the level of a student's understanding and performance, combining the knowledge dimension (factual, conceptual, procedural and metacognitive) with the cognitive dimension (remember, understand, apply, analyse, evaluate, create) (Figure 1).

4.2 | Framework for curricular development in undergraduate education in periodontology: Areas of competence and learning outcomes

The following forms the framework for curricular development in periodontal undergraduate dental education, reflecting modern dental educational practice and providing guidance for dental educators, institutions and societies (Figuero et al., 2024).

The competencies and learning outcomes have been revised and re-categorized according to the ADEE-based educational domains (I–IV) and the four areas of competence: I, professionalism; II, safe and effective clinical practice; III, patient-centred care; and IV, dentistry in society (Field, Cowpe, & Walmsley, 2017; Field, DeLap, & Manzanares Cespedes, 2017; Field, Kavadella, et al., 2017; Field, Walmsley, et al., 2017; Gallagher & Field, 2017; McLoughlin et al., 2017).

DOMAIN I: PROFESSIONALISM

1.1 Ethics

Learning outcomes: The graduating dentist must be able to carry out the following:

1. Apply the moral and ethical standards involved in the provision of periodontal/peri-implant care to individuals, populations and

communities without prejudice in respect of their age, culture and diversity of background (e.g., observed principles of good clinical practice).

2. Place the patient at the centre of care and focus on their best interests and values during all interactions, including diagnosis and personalized care provision.
3. Obtain informed consent by providing adequate information and recognizing patient confidentiality.

TABLE 4a Roles and countries of participants in Working Group 1.

Role	Full name	Country
Chair1	Jepsen S	Germany
Chair2	Sanz M	Spain
Reviewer1	Gürsoy M	Finland
Reviewer2	Wilensky A	Israel
Reviewer3	Eickholz P	Germany
Reviewer4	Monnet-Corti V	France
Reviewer5	Figuero E	Spain
Reviewer6	Sanz M	Spain
UCM expert	Montero E	Spain
UCM expert	Iniesta M	Spain
EFP representative	Danser M	Netherlands
ADEE representative	Quinn B	UK
Dentaid representative	Saez J	Spain
Participant1	Aimetti M	Italy
Participant2	Bostanci N	Sweden
Participant3	Cosgarea R	Germany
Participant4	Huck O	France
Participant5	Madianos P	Greece
Participant6	Nibali L	UK
Participant7	West NX	UK
Participant8	Windisch P	Hungary

Abbreviations: ADEE, Association for Dental Education in Europe; EFP, European Federation of Periodontology; UCM, University Complutense of Madrid.

TABLE 4b Roles and countries of participants in Working Group 2.

Role	Full name	Country
Chair1	Berglundh T	Sweden
Chair2	Tonetti M	China
Reviewer1	Goldstein M	Israel
Reviewer2	Donos N	UK
Reviewer3	Teughels W	Belgium
UCM expert	Sánchez N	Spain
EFP representative	Vasilopoulos S	Greece
Dentaid representative	Blanc V	Spain
Participant1	Cairo F	Italy
Participant2	Calciolari E	UK
Participant3	Carra MC	France
Participant4	Derks J	Sweden
Participant5	Eren Kuru B	Türkiye
Participant6	Jepsen K	Germany
Participant7	Nart J	Spain
Participant8	Polyzois I	Ireland
Participant9	Sanz Sánchez I	Spain
Participant10	Vandamme K	Belgium
Participant11	Verket A	Norway

Abbreviations: EFP, European Federation of Periodontology; UCM, University Complutense of Madrid.

PHOTOGRAPH 2a Workshop participants in Working Group 1.

PHOTOGRAPH 2b Workshop participants in Working Group 2.

TABLE 4c Roles and countries of participants in Working Group 3.

Role	Full name	Country
Chair1	Kebschull M	UK
Chair2	Sculean A	Switzerland
Reviewer1	Winning L	Ireland
Reviewer2	Lambert F	Belgium
Reviewer3	Meyle J	Germany
UCM expert	Molina A	Spain
EFP representative	Rakic M	Serbia
ADEE representative	Barkvoll P	Norway
JCP editor	Papapanou P	USA
Dentaid representative	Ballesteros C	Spain
Participant1	Blanco J	Spain
Participant2	Bouchard P	France
Participant3	Faria-Almeida R	Portugal
Participant4	Graziani F	Italy
Participant5	Harrison P	Ireland
Participant6	Stavropoulos A	Sweden

Abbreviations: ADEE, Association for Dental Education in Europe; EFP, European Federation of Periodontology; JCP, *Journal of Clinical Periodontology*; UCM, University Complutense of Madrid.

4. Use a respectful approach to the environment during clinical practice and encourage realistic/practical solutions to improve sustainability.

1.2 Regulation

Learning outcomes: The graduating dentist must be able to do the following:

1. Apply strategies to minimize possible health risks derived from the use of preventive, diagnostic and therapeutic procedures (i.e., ionizing radiation exposure, antimicrobial resistance due to misuse of antimicrobials).
2. Comply with the legislative and administrative processes that impact the practice of periodontology, including infection prevention/control procedures, periodontal diagnosis and care and data protection regulations.

1.3 Professional behaviour

Learning outcomes: The graduating dentist must be able to do the following:

1. Demonstrate practical skills, including analytical problem solving, planning, communication, presentation, team building and leadership skills.
2. Integrate contemporary knowledge and understanding of the broader issues of periodontology (i.e., impact on quality of life and systemic health) and the relevance of these issues into clinical practice.
3. Use appropriate professional behaviour towards patients and all team members in the field of dentistry, medicine and other multidisciplinary environments.
4. Reflect on their own decisions, actions and performance and be able to apply these to the process of CPD.

DOMAIN II: SAFE AND EFFECTIVE CLINICAL PRACTICE

2.1 Evidence-based practice

Learning outcomes: The graduating dentist must be able to do the following:

PHOTOGRAPH 2c Workshop participants in Working Group 3.

TABLE 4d Roles and countries of participants in Working Group 4.

Role	Full name	Country
Chair1	Chapple IL	UK
Chair2	Herrera D	Spain
Reviewer1	Loos BG	Netherlands
Reviewer2	Ramseier CA	Switzerland
Reviewer3	Preshaw PM	UK
UCM expert	Matesanz P	Spain
ADEE representative	Vital S	France
ADEE representative	Field J	UK
Dentaid representative	León R	Spain
Participant1	Buduneli N	Türkiye
Participant2	Christiaens V	Belgium
Participant3	Davey K	UK
Participant4	De Bruyn H	Netherlands
Participant5	Dommisch H	Germany
Participant6	Gkranias N	UK
Participant7	Gosset M	France
Participant8	Trombelli L	Italy

Abbreviations: ADEE, Association for Dental Education in Europe; EFP, European Federation of Periodontology; UCM, University Complutense of Madrid.

1. Use evidence-based knowledge and critical thinking in daily practice, including health promotion, behaviour change, risk assessment, diagnosis and treatment of periodontal/peri-implant diseases.
2. Evaluate critically the validity of claims (industry, social media, etc.) in relation to the clinical and environmental risks, benefits and costs of products, processes and procedures.

2.2 Management and leadership

Learning outcomes: The graduating dentist must be able to carry out the following:

1. Implement teamwork and leadership skills, including the delegation of relevant tasks to dental/oral hygienists and other OHPs.
2. Identify, manage and minimize adverse events to patients and/or staff in the short and long term.

2.3 Teamworking and communication

Learning outcomes: The graduating dentist must be able to do the following:

1. Communicate effectively, interactively and reflectively with patients and, if appropriate, with their families or caregivers, together with other health professionals involved in the care.
2. Identify, manage and minimize adverse events to patients and/or staff in the short and long term.
3. Provide relevant information to the dental team and patients, using contemporary periodontal terminology, including lay language, if appropriate, when talking to patients.
4. Generate a patient–dentist relationship that emphasizes the patient's role and responsibility as team member to allow the effective delivery of periodontal care and ensures awareness of the importance of long-term compliance.

2.4 Audit and risk management

Learning outcomes: The graduating dentist must be able to do the following:

PHOTOGRAPH 2d Workshop participants in Working Group 4.

FIGURE 1 A model of learning objectives–based on 'A Taxonomy for Learning, Teaching, and Assessing: A Revision of Bloom's Taxonomy of Educational Objectives' by Rex Heer, Center for Excellence in Learning and Teaching, Iowa State University, licensed under a CC BY-SA (Attribution-ShareAlike) 4.0 International Licence retrieved from https://rotel.pressbooks.pub/readwritesuccess/chapter/understanding-bl.

1. Carry out safe clinical practice and provide a safe working environment (i.e., audit, infection control measures, quality assessments of outcomes of the care provided and of the protocols, devices and instruments used).

2.5 Professional education and training

Learning outcomes: The graduating dentist must be able to carry out the following:

1. Promote time management skills.
2. Recognize their own limitations, as the complexity of periodontal/peri-implant diseases may exceed their competence in general practice and may warrant referral to a specialist or other dentists with specific training.
3. List available career choices and training opportunities in periodontology.
4. Generate self-learning and methods to acquire knowledge and seek continuing professional education, to ensure that clinical skills and evidence-based knowledge are maintained and updated, as scientific and technological advances occur continuously and justify a constant review of the standards of periodontal practice.

DOMAIN III: PATIENT-CENTRED CARE

3.1. Application of the scientific basis in periodontal/peri-implant health care

A graduating dentist must be able to demonstrate an understanding of, and to apply, the scientific knowledge base relating to the following:

1. The scientific basis of periodontal and peri-implant health, including the relevant knowledge of periodontal and peri-implant anatomy and physiology, as well as the necessary foundational sciences.
2. The aetiology and pathogenesis of periodontal and peri-implant diseases, including the oral microbiome, host response as well as genetic, systemic and local risk factors.
3. The aetiology and pathogenesis of halitosis, as well as its relationship with periodontal and peri-implant diseases.
4. The associations between periodontal or peri-implant diseases and systemic diseases, being able to interpret the epidemiological evidence, their biological and pathophysiological mechanisms as well as their preventive and therapeutic implications.
5. The healing process following tooth extraction.
6. The healing process following the placement of a dental implant, including its osseointegration and integration into soft tissues.

3.2. Gathering clinical information for the diagnosis of periodontal and peri-implant diseases and conditions

To determine diagnosis(es), a graduating dentist must be able to effectively carry out the following:

1. Obtain and interpret a medical and dental history, including the chief complaint, and if needed refer to another healthcare professional.
2. Examine the individual extra- and intra-orally, specifically differentiating between physiological and pathological conditions.
3. Carry out a comprehensive periodontal/peri-implant assessment including recording of missing teeth, dental biofilm accumulation, inflammation (e.g., bleeding on probing), suppuration, probing depths, gingival or mucosal recession, clinical attachment levels, furcation involvements, tooth mobility, sensibility testing and occlusion).
4. Determine the need to conduct radiological examinations, and evaluate the radiographic images in relation to periodontal/peri-implant pathology and diagnoses.
5. Select the cases that may benefit from additional diagnostic techniques, such as 3D digital imaging as well as microbiological, genetic and biochemical diagnostic tools.
6. Apply the current classification for periodontal and/or peri-implant diseases and conditions, considering that the diagnosis may have to be updated during the course of care.

3.3. Care planning

To formulate a personalized care plan, a graduating dentist must be able to effectively do the following:

1. Assign prognosis at the individual and general level.
2. Generate alternative care options based on current CPGs to facilitate shared decision making.
3. Inform the individual about diagnoses, prognoses, alternative care plans as well as their benefits, risks and cost.
4. Develop a comprehensive prevention programme (primordial, primary, secondary, tertiary prevention) to maintain periodontal and peri-implant health.

3.4. Establishing and maintaining periodontal/peri-implant health

To provide personalized care, a graduating dentist must be able to effectively carry out the following:

1. Use validated risk factor control protocols when appropriate (e.g., tobacco cessation, improved metabolic control of diabetes).
2. Assess individuals' oral hygiene and implement behaviour change strategies to establish optimal and personalized home care (oral hygiene) practices.
3. Carry out supra and subgingival/submarginal instrumentation, with or without adjunctive interventions, and correct biofilm retentive factors, based on current CPGs.
4. Manage acute lesions (abscesses and necrotizing periodontal diseases) and endo-periodontal lesions.
5. Evaluate the individual response to therapy, the achievement of the goals of periodontal/peri-implant therapy and the need for further therapy.
6. Determine the indications and identify the objectives of the different periodontal and peri-implant surgical interventions.
7. Carry out infection control and pain management measures throughout non-surgical periodontal/peri-implant procedures, including the rational prescription of antimicrobial and analgesic medications.
8. Implement personalized supportive periodontal/peri-implant care in co-operation with other healthcare professionals when appropriate.

DOMAIN IV: DENTISTRY IN SOCIETY

4.1. Dental public health related to periodontology

Learning outcomes: The graduating dentist must be able to perform the following:

1. Identify the social determinants of health, oral health and quality of life as well as their impact on the periodontal/peri-implant health of the individuals, families and groups in society.
2. Comply with and contribute to dental public health strategies by understanding the OHP's role in affecting the health and oral health of defined populations.
3. Recognize the epidemiology of periodontal/peri-implant diseases across different populations as well as the importance of socio-economic factors and the costs of periodontal/peri-implant treatment.
4. Identify the structure and components of the healthcare systems providing oral care.
5. Recognize the importance of collaboration with stakeholders and community-based health and oral health education groups, such as schools and health service providers in other fields.

5 | WG 2: SPECIALIST TRAINING IN PERIODONTOLOGY

WG 2 focused on specialist education/training in periodontology, that is, a programme aimed at training specialists in periodontology. Thus, the remit of WG2 was to critically assess and update the competencies and learning outcomes that were established in the 2010 consensus report (Van der Velden & Sanz, 2010) within the first European Consensus Workshop on Periodontal Education, adapted for the training of a contemporary specialist in periodontology. An update was considered justified, as the field of periodontology has evolved in terms of diagnosis, pathobiology, classification, treatment guidelines and clinical techniques. In addition to the update of competencies and learning outcomes, WG2 also assessed education methods used in specialist programmes in periodontology and how the 2018 periodontal and peri-implant disease classification and CPGs were implemented in training programmes. For this purpose, three reviews were conducted. The first one, led by Moshe Goldstein, addressed competencies/learning outcomes in specialist periodontal education, by assessing the relevance and impact of the 2010 recommendations and providing suggestions for future modifications. The second, directed by Nikos Donos, focused on education methods, evaluation of trainees regarding competencies/learning outcomes and educational quality assurance in specialist periodontal education. And the third one, commissioned to Wim Teughels, evaluated how the new classification and CPGs were implemented in specialist periodontal education. The three reviews are presented as the three sections of the WG2 review (Goldstein et al., 2024).

The experiences of the EFP-accredited programmes are crucial in the evaluation of the recommendations of the 2009 Consensus Workshop. Two surveys were therefore designed and sent to programme directors and graduates. The results from the surveys were included in the evaluations in each of the reviews. In addition, WG2 addressed the scope of specialist training and the specialist's role in oral health care.

5.1 | Introductory statements

5.1.1 | What is the role of specialists in periodontology in the healthcare system?

Periodontal diseases and conditions comprise a broad range of highly prevalent and socially relevant pathologies. These contribute greatly to the burden of oral diseases and loss of quality of life either directly or as a major cause of tooth loss in the population. In addition, prevention and management of periodontal diseases is part of the effective management of chronic diseases such as diabetes, rheumatoid arthritis and cardiovascular disease and contributes to the decrease of adverse events of several pharmacological treatments.

Specialists in periodontology are essential for planning and enabling the delivery of the full spectrum of services and effectively contribute to oral health and management of medical co-morbidities. They are the key professionals able to lead the delivery of periodontal care, coordinate primary and secondary care, directly manage the more complex cases, provide CPD and educate/tutor dentists with an expanded interest during their vocational training pathway.

Specialists in periodontology operate in (i) dedicated secondary care facilities either in the public or private sector, or (ii) multidisciplinary dental offices/clinics. They are a resource for oral/dental hygienists/therapists, general dentists, dentists with a special interest in periodontology and medical teams. In addition, specialists may play a critical role in higher education and research.

Management of periodontal diseases and conditions conforming to CPGs requires specific professional competencies that span the scope of practice of multiple oral healthcare professionals: oral/dental hygienists/therapists, general dentists, dentists with a special interest in periodontology and specialists in periodontology. While screening and diagnosis of periodontal diseases fall within the remit of general dental practitioners, management of periodontal diseases involves a spectrum of complex treatments that are broadly based on case definitions and map to different competencies/learning outcomes.

Specialists in periodontology are proficient in the management of the full spectrum of periodontal and peri-implant diseases and conditions as well as the planning and the surgical aspects of complex rehabilitation therapy, including implant placement. Specialists in periodontology also coordinate with medical and dental specialists when managing complex cases. The educational hallmark of specialist training is achieving proficiency in the critical aspects of management of periodontal/peri-implant diseases and conditions as well as the surgical component of implant therapy, and the ability to embark in a post-qualification educational process that establishes them as the ultimate experts and, as such, a resource for the healthcare system.

5.1.2 | How are specialists in periodontology trained and accredited?

Following accreditation as general dental practitioners and achievement of adequate basic clinical experience, specialists in periodontology are trained for a minimum 3 years of full-time enrolment (or appropriately adjusted part-time enrolment, see next paragraph) in an accredited and structured programme provided within a supervised environment. The scope of training encompasses the acquisition and demonstration of in-depth knowledge, clinical proficiency and research ability.

The European Directive 2005/36/EC (latest updated in October 2023) defines, in article 35, the conditions for specialist dental training: 'Full-time specialist dental courses shall be of a minimum of three years' duration and shall be supervised by the competent authorities or bodies' (The European Parliament and the Council of the European Union, 2005). Article 22 of the same European Directive stipulates conditions for part-time training: 'Member States may authorise part-time training under conditions laid down by the competent authorities; those authorities shall ensure that the overall duration, level and quality of such training is not lower than that of continuous full-time training' (The European Parliament and the Council of the European Union, 2005).

Upon successful completion, the trainee receives a certificate of completion of specialist training (CCST), which is required for either direct registration as a specialist with a national registry or for entry into additional examinations. Some countries have not yet established formal recognition of periodontology as a dental specialty. There is an urgent need to address this disparity. In some countries, registries of trained specialists are maintained by the national societies of periodontology.

At present, there is no cross-border portability of the title of 'Specialist in Periodontology' as regulated by the European Union. There is an urgent need to address this issue.

5.1.3 | What is an accredited training programme in periodontology?

An accredited programme is run by a specific institution and by a training team led by a director. These conform to a set of a priori criteria aimed at ensuring a minimum training standard in terms of scope and learning methods and the proficiencies of the individual trainee.

Conformity is verified and accreditation is granted by an independent body. The EFP Post-graduate Education Committee (now EFP Education Committee) and the Committee of Dental Accreditation of the American Dental Association are examples of such accreditation bodies.

In the US system, additional verification of the proficiencies of a graduate from an accredited programme in periodontology is achieved by an external examination administered by the American Board of Periodontology. In Europe, the objective is achieved by having an EFP-appointed external examiner as part of the final examination team, who grants the EFP CCST in periodontology and implant dentistry.

5.2 | Specialist training programs in periodontology and implant dentistry

5.2.1 | What is the scope of an education programme aimed for training specialists in periodontology?

The training of a specialist in periodontology must be delivered by an accredited programme within a supervised environment in order to provide high levels of knowledge in the discipline along with the necessary competencies and relevant clinical skills. A specialist training programme in periodontology must comprise a minimum of 3 years of full-time study (or appropriately adjusted part-time enrolment, as explained before), enabling the trainee to become proficient in the management of the full spectrum of periodontal and peri-implant diseases and conditions as well as in the planning and the surgical component of complex rehabilitation therapy, including implant dentistry. The curriculum must consist of a didactic, a clinical and a research component.

5.2.2 | What are the requirements for trainees to be enrolled in a specialist training programme in periodontology?

1. Have a university degree in dental medicine/surgery.
2. Have a good understanding of the English language.
3. For international trainees (i.e., those who originate from a country other than the one where the training institution is located) to be able to communicate in the local language.
4. Be competent in clinical aspects of general dentistry and patient management.
5. Be familiar with digital tools (e.g., computer skills, digital word processing and presentation software).

5.2.3 | Which domains among competencies and proficiencies in periodontal education at the specialist level have been changed since the first European Consensus Workshop on Periodontal Education?

Competencies and proficiencies were listed under nine different domains. Critical changes/additions relative to the First European Consensus Workshop on Periodontal Education (Van der Velden & Sanz, 2010) were made. For details, see the Tables 5a–5e. Changes were made in five of the domains:

- Clinical aspects of periodontology and implant dentistry.
- Clinical epidemiology with an emphasis on periodontal/peri-implant diseases, as well as the importance of public health service respecting the ethnicity, gender and cultural diversity of patients.
- Clinical guidelines pertaining to the management of periodontal and peri-implant diseases, following current guidelines.

TABLE 5a Learning outcomes in periodontal education at the specialist level—didactic component.

1. Be proficient in the basic sciences relevant to periodontology and implant dentistry
a. Understand the biology of cell function, cell-to-cell interactions, cell-matrix interaction, regulation of cellular function and the role of cytokines and growth factors.
b. Have comprehensive knowledge of principles related to wound healing and regeneration.
c. Have comprehensive knowledge of the composition of dental biofilm and its chemical and microbial structure at teeth and implants. Be proficient in the literature pertaining to the relationship of dental biofilm and periodontal and peri-implant diseases, and have a basic understanding of culture techniques and tests to identify bacterial strains.
d. Have comprehensive knowledge of the microbial flora related to the oral environment (supra- and sub-gingival) in subjects with or without teeth/implants.
e. Have comprehensive knowledge of the effects of antibiotics on micro-organisms associated with periodontal and peri-implant diseases. Have comprehensive knowledge of the scientific evidence on the benefits and risks associated with the use of antibiotics in the management of these diseases.
f. Have comprehensive knowledge of antiseptic and antimicrobial products (e.g., mouth rinses, local application devices, etc.) and their role in the control of bacterial plaque as well as their effectiveness in the treatment of periodontal/peri-implant diseases.
g. Have comprehensive knowledge of the pathogenic mechanisms of inflammation, the pathogenesis of gingival inflammation and the effects of inflammation on periodontal and peri-implant tissues. Be competent in the histopathological development of periodontal and peri-implant diseases.
h. Know the (cellular) immunological mechanisms involved in the inflammatory response in periodontal and peri-implant soft tissues.
i. Know the various (cellular) mechanisms leading to loss of periodontal attachment.
j. Know the various (cellular) mechanisms leading to peri-implant bone loss.
k. Have comprehensive knowledge of bone biology and socket healing, including the cellular reactions in the process of bone formation and remodelling.
2. Be competent in all clinical aspects of periodontology and implant dentistry
a. Have comprehensive knowledge of the macro- and micro-anatomy and histology of periodontal and peri-implant structures.
b. Have comprehensive knowledge of the biological and clinical mechanisms related to bone formation, bone grafting and bone regeneration.
c. Have a complete understanding of the process of osseointegration as well as the biology of transmucosal soft-tissue integration.
d. Have a complete understanding on the integration of basic sciences with clinical aspects of periodontal/peri-implant health and disease.
e. Have knowledge of modern implant designs and systems. Have knowledge of metallurgical and chemical structures of dental implants.
f. Know the types, advantages/disadvantages and clinical indications of reconstructive materials, including barrier membranes, bone substitute materials and biologically active agents.
g. Have comprehensive knowledge of the restorative, endodontic and orthodontic aspects related to periodontal and implant therapy.
h. Have comprehensive knowledge of the inter-relationship between periodontitis and pulpal diseases.
i. Understand the timing of adjunctive orthodontic, restorative and prosthetic therapy in all phases of multi-disciplinary treatment.
j. Have a good understanding of prosthetic/restorative therapy on natural dentition and dental implants.
k. Have knowledge of possible interactions between occlusal discrepancies and periodontal or peri-implant disorders.
l. Know how to evaluate and interpret both normal and pathological structures identified on two-dimensional (periapical/orthopantomogram) and three-dimensional (computerized tomography) technology.
3. Have comprehensive knowledge of clinical epidemiology with an emphasis on periodontal/peri-implant diseases, as well as the importance of public health service respecting the ethnicity, gender and cultural diversity of patients.
4. Have comprehensive knowledge of classifications of periodontal and peri-implant diseases/disorders with a specific focus on the most recent versions
a. All forms of periodontal diseases in both adult and young patients and their differential diagnoses.
b. Clinical features and diagnosis of gingivitis.
c. Clinical features of the different stages and grades of periodontitis.
d. Clinical features and differential diagnoses of peri-implant diseases.
e. Clinical features and differential diagnoses of mucogingival defects and irregularities at teeth, implants and edentulous ridges.
f. Clinical manifestation and diagnoses of periodontal and peri-implant acute/emergency situations.
5. Have comprehensive knowledge of clinical guidelines pertaining to the management of periodontal and peri-implant diseases, following current guidelines.
a. Have comprehensive knowledge of the effects of patient-performed plaque control measures in cases of gingivitis and periodontitis.
b. Have comprehensive knowledge of the science behind and clinical effects of behavioural interventions (including tobacco-cessation, and life style and dietary advice).
c. Have comprehensive knowledge of the effects of professionally performed non-surgical therapy on periodontal diseases.
d. Have comprehensive knowledge of the effects of professionally performed non-surgical therapy of peri-implant mucositis and peri-implantitis.
e. Have comprehensive knowledge of the effects of systemic antibiotics in conjunction with non-surgical therapy of periodontal and peri-implant diseases.
f. Have comprehensive knowledge of the effects of antiseptic/antimicrobial oral rinses and locally delivered products in conjunction with non-surgical therapy of periodontal and peri-implant diseases.
g. Have comprehensive knowledge of the main groups of surgical techniques used in periodontics, their indications and contraindications, as well as their advantages and disadvantages.

(Continues)

TABLE 5a (Continued)

h. Have comprehensive knowledge of the effects of surgical therapy of peri-implantitis, including the possible use of adjunctive antiseptics/antibiotics and various decontamination procedures.
i. Have comprehensive knowledge of periodontal supportive therapy and be fully acquainted with the relevant research and clinical applications.
6. Understand possible interactions between oral and systemic diseases
a. Be competent in managing periodontal pathologies in medically compromised patients, and to communicate efficiently with these patients and medical professionals.
b. Have comprehensive knowledge of the possible interactions between systemic and periodontal diseases: i. Be fully acquainted with systemic disorders that may influence the response of periodontal tissues to plaque-associated inflammatory disease. ii. Understand systemic diseases for which periodontitis is a risk factor. iii. Be aware of those systemic disorders that may manifest themselves in the periodontal tissues, with or without a pre-existing plaque-induced inflammatory response.
7. Have comprehensive knowledge of possible drug interactions, side effects, contraindications and identification of substance-use disorders
8. Be proficient in searching, identifying and evaluating relevant scientific literature
a. Have a good understanding of research methodology and the different types of study designs (in vitro/pre-clinical, in vivo/RCTs/cohort studies/case series).
b. Be able to analyse and communicate the content of a scientific article and critically evaluate a study's validity and impact.
9. Be proficient in preparing and presenting all stages of a treated clinical case presenting with periodontal/peri-implant disease. Be proficient in discussing decision making, clinical procedures and their outcomes based on the scientific literature and general clinical knowledge.

- Possible drug interactions, side effects, contraindications and identification of substance-abuse disorders.
- Preparing and presenting all stages of treated clinical cases. Discussion of decision making, clinical procedures and their outcomes based on the scientific literature and general clinical knowledge.

5.2.4 | Have learning outcomes including didactic, clinical performance and research components in periodontal education at the specialist level changed since the first European Consensus Workshop on Periodontal Education?

Similar to the first European Consensus Workshop on Periodontal Education (Van der Velden & Sanz, 2010), learning outcomes were categorized into (i) didactic, (ii) clinical and (iii) research. While the category of didactic learning outcomes remained largely unchanged, critical components were added to the clinical domain, separated into general and specific clinical learning outcomes. Examples of additions include traditional surgical techniques, new digital techniques used in diagnostics and treatment, procedures related to the management of peri-implantitis as well as advanced reconstructive surgery. Learning outcomes related to research have been made more specific (e.g., critical contribution to a research project, be knowledgeable in statistical analysis). For details, see Tables 5a–5e.

5.2.5 | What are the methods/requirements for achieving learning outcomes in periodontal education at the specialist level?

To achieve the competencies, proficiencies and learning outcomes expected at the specialist level, the programme should meet specific standards for the course, for the faculty, for the training facility and its clinical activity, for the monitoring system and for the curriculum and its different components.

5.2.6 | Which education methods should be employed in specialist programmes in periodontology?

Education in specialist training programmes should be a dynamic process including periodical updates/assessments and integration of multiple teaching methods, such as

- student-centred and real-time learning approaches preferably involving small group teaching and group discussions to stimulate reflection, reflective practice and engagement of the student;
- a combination of face-to-face and virtual didactic lectures, case-based seminars, journal club sessions, problem-based learning (PBL), simulation-based learning, peer-assisted learning, observational learning and team-based learning;
- experiential learning and a learning cycle, by which students 'learn by doing' and by reflecting on the experience, including hands-on laboratory experiments, simulation-based learning, internships, practicals and field exercises.
- proficiency-based progression training in which an operative procedure is subject to a task analysis to identify performance metrics essential to the completion of the task; and
- mentoring/proctoring to monitor the learning curve for periodontal and dental implant treatment procedures until proficiency is reached.

5.2.7 | What is the role of digital education methods, including artificial intelligence and virtual reality in specialist programmes in periodontology?

Digital education methods are complementary strategies to be developed, adapted and applied in specialist training programmes in

TABLE 5b Learning outcomes in periodontal education at the specialist level—clinical component: general learning outcomes.

Clinical component: general learning outcomes	1. Be proficient in applying appropriate interpersonal and communication skills and effectively communicating with individuals from diverse social backgrounds. 2. Be proficient in carrying out an appropriate examination, diagnosis, prognosis, treatment planning and treatment of diseases and disorders affecting the periodontium and peri-implant tissues. 3. Be proficient in carrying out an appropriate examination, diagnosis, case selection, treatment planning and surgical procedures for the successful placement and maintenance of dental implants. 4. Be proficient in diagnosing and managing advanced multi-disciplinary cases (combined problems of periodontal disease in addition to systemic, restorative and/or prosthetic considerations) and be able to carry out the periodontal component of such treatments. Be proficient in performing interdisciplinary treatment in cooperation with other dental disciplines and evaluating the change in overall prognosis. 5. Be competent in digital examination and evaluation tools: a. use of intra-oral digital scanners. b. use of imaging and treatment planning software. c. use of computerized tomography scans for evaluating tooth structures, periodontal anatomy and/or dental implants. 6. Be proficient in collecting and interpreting high-quality clinical documentation, including a. precise and detailed clinical assessments (with emphasis on periodontal parameters) at all stages of treatment. b. periapical and bite-wing roentgenograms. c. intra- and extra-oral photography.

periodontology. Digital education must involve evidence-based, validated and high-quality tools to minimize the risk of misleading content in the digital sources of information.

Available digital education methods include

- on-line pedagogical software tools, including live or streamed videos, virtual meetings, social media groups and real-time interactive classes;
- tele-dentistry and monitoring;
- augmented reality and virtual reality (VR); and
- Artificial intelligence (AI) to assist with education and clinical decision making, teaching assistance in generating exercises, quizzes and clinical case scenarios, language assistance in translations, explanations and summaries and research assistance.

The World Health Organization has recently advocated for the safe and ethical use of AI (World Health Organization, 2023).

Dissemination of high-quality educational content via formal educational providers for quality assurance of assessments and peer-review processes is recommended.

5.2.8 | How should learning outcomes be assessed in specialist training programmes in periodontology?

The requirements for assessment procedures and performance criteria are consistent with the recommendations by the first European Consensus Workshop on Periodontal Education (Van der Velden & Sanz, 2010):

1. Clearly defined criteria for the learning outcomes should be communicated to the trainee.
2. Multiple methods of assessments should be used and multiple evaluations of performance should be carried out.
3. Both formative and summative assessments should be employed.
4. The alignment of the learning content, the method of teaching and learning and the assessment should be clear and demonstrable.

Based on the Miller Pyramid (Miller, 1990) for assessing theoretical and practical knowledge/skills in medical education, the assessment of competencies/learning outcomes includes four levels: 'knows', 'knows how', 'shows how' and 'does'. The first two levels should be assessed by written (including multiple-choice, single best answer, short answers or essay-based) and/or oral exams. The 'show how' level is assessed in a pre-clinical environment (using simulators) and should also take advantage of computer-based technologies (such as VR and augmented reality [AR] tools) and of objective structured clinical examinations (OSCEs).

The 'does' level should be assessed via workplace-based assessments (WPBA), which will entail direct and indirect assessments performed in the structured and supervised environment of an accredited educational provider. WPBA should include multi-source feedback, which is a structured method to obtain feedback from peers, co-workers and patients. The principle of supervised learning events could also be a valid integration to WPBAs, as it facilitates continuous formative assessment. Emphasis should be placed on students' reflective learning to achieve a deeper meaning and understanding of their professional development.

The assessment of research competencies is performed by producing a research report/thesis, which will be also evaluated in an oral exam.

5.2.9 | How is education quality assurance achieved in specialist training programmes in periodontology?

Specialist training programmes in periodontology should undergo regular evaluations for quality assurance, which follow the overarching principles of reliability, transparency, trust and validity. The 'Standards

TABLE 5c Learning outcomes in periodontal education at the specialist level—clinical component: specific learning outcomes 1–5.

Clinical component: specific learning outcomes 1–5	1. **Be proficient in the examination and treatment planning of patients showing periodontal disease and/or patients in need of mucogingival repair, and/or patients in need of tooth replacement (including dental implant therapy). Be proficient in applying clinical guidelines to patient care.** 2. **Be proficient in recognizing the various forms of periodontal and peri-implant diseases in order to make a diagnosis, evaluate prognosis and prepare an adequate treatment plan** a. be proficient in diagnosing cases of gingivitis b. be proficient in diagnosing and classifying cases of periodontitis. c. be proficient in diagnosing peri-implant complications, such as peri-implant mucositis and peri-implantitis. d. be proficient in recognizing muco-cutaneous disorders or oral manifestations of systemic diseases and know when to refer the patients for further examination. 3. **Be proficient in the implementation of guidelines for assessment and control of periodontal and peri-implant risk factors** a. oral hygiene motivation and patient-performed plaque control b. smoking cessation, life style and dietary recommendations. 4. **Be proficient in performing (and documenting) non-surgical therapy of periodontal and peri-implant diseases, including** a. supra- and sub-gingival mechanical or power-driven instrumentation. b. adequate use of antiseptic/anti-microbial agents. c. adequate and controlled use of systemic antibiotics. 5. **Be proficient in performing (and documenting) a wide range of periodontal surgical procedures, including** a. gingivectomy/gingivoplasty/local excision procedures; b. periodontal flap surgery, including access flaps and resective surgery, with or without concomitant osseous surgery. Know the indications and contraindications of and be competent in different techniques; c. root resection/hemisection/tunnelling procedures; d. mucogingival and plastic periodontal surgery procedures. Know the indications and contraindications of and be competent in different techniques. Acquire knowledge in the application of different micro- and macro-surgical instruments and related techniques in terms of efficacy and efficiency. Be familiar with autogenous and soft-tissue substitute materials; e. reconstructive periodontal surgery procedures. Know the indications and contraindications of and be competent in different techniques. Acquire knowledge in the use of different bone substitute materials, barrier membranes and biologically active materials.

and Guidelines for Quality Assurance in the European Higher Education Area' (European Union, 2015) should be followed, which include three components:

- Internal quality assurance (by the institution)
- External quality assurance (by external experts)
- Quality assurance agencies (by independent bodies)

Key stakeholders (particularly patients and trainees) should be actively involved in quality assurance.

5.2.10 | To what degree have the 2018 classification of periodontal and peri-implant diseases and conditions and the EFP CPGs been implemented in specialist training programmes in periodontology?

According to a survey among directors of EFP-accredited programmes, the 2018 Classification of Periodontal and Peri-implant Diseases and Conditions is widely utilized (Caton et al., 2018). Previous classifications are still taught for various reasons, including appreciation of published literature, communication with referring practitioners and national health policies.

All EFP-accredited programmes have adopted the EFP CPGs (Herrera et al., 2022, 2023; Sanz et al., 2020) and found them valuable from an educational perspective.

5.2.11 | How does the design of current and future curricula of specialist training programmes in periodontology benefit from the 2018 classification and the CPGs?

Incorporating the 2018 classification and CPGs into specialist training has numerous advantages. They promote (i) understanding of the decision-making process with respect to the patient's treatment, (ii) a solid foundation for evidence-based practice, (iii) high quality of dental care and patient safety, (iv) developing critical appraisal skills, (v) uniformity across educational programmes, (vi) lifelong learning and CPD, and (vii) research. CPGs have limitations, however, as they require customization according to the patient's individual condition, values and preferences as well as to socio-economic and regulatory considerations.

6 | WG 3: CONTINUING EDUCATION, CPD AND VOCATIONAL EDUCATION AND TRAINING

WG 3 focused on training for dental professionals after their graduation from the university with a professional degree. The WG examined a large and diverse field of CPD, comprising non-structured programmes, often collectively referred to as continuing education (CE), and structured formats summarized as vocational education and

TABLE 5d Learning outcomes in periodontal education at the specialist level—clinical component: specific learning outcomes 6–11.

Clinical component: specific learning outcomes 6–11	6. **Be proficient in performing (and documenting) periodontal pre-prosthetic procedures** a. clinical crown lengthening; b. treatment of excessive gummy smile; c. soft- and hard-tissue reconstruction of deficient residual ridges towards prosthetic rehabilitation. 7. **Be proficient in the different aspects of surgical implant therapy, including surgical placement of dental implants in all areas of the dentition, in both full and partially edentulous patients** a. be proficient in planning and placing implants in healed edentulous ridges; b. be proficient in the management of extraction sites, including bone regeneration and/or soft-tissue augmentation procedures concomitant with or prior to implant placement; c. be competent in the reconstruction of deficient edentulous ridges by lateral or vertical ridge reconstruction. Know the indications, contraindications and limitations of different techniques. Be competent in the use of different bone substitute materials, barrier membranes and application of adequate flap techniques and soft-tissue augmentation procedures, concomitant with or prior to implant placement. d. have experience in sinus floor augmentation procedures, by both trans-crestal and lateral window techniques, concomitant with or prior to implant placement; e. be proficient in the planning of implant placement in consideration of prosthetic management and function, and overall aesthetic and maintainability aspects. Be able to plan flap design, implant position and direction and healing time. 8. **Be proficient in surgical techniques for the management of peri-implant diseases** a. Flap surgery, including access, resective and reconstructive procedures. Know their indications, contraindications and limitations. b. Soft-tissue mucogingival surgical procedures. Know the indications and contraindications and be competent in different techniques. Be familiar with autogenous and soft tissue substitute materials. 9. **Be proficient in critically evaluating results of each step of therapy. Be able to interpret the final results of the performed treatment and to evaluate future prognosis. To carry out any additional procedures required to improve treatment outcomes and/or to successfully maintain treatment results.** 10. **Be proficient in planning and performing periodontal supportive therapy (maintenance) as related to the treatment performed and to patient-related risk factors.** 11. **Be proficient in complete documentation during each phase of treatment (medical records, charts, analog and digital models, clinical photographs) in order to chronologically follow and, if required, to present clinical cases for evaluation.**

TABLE 5e Learning outcomes in periodontal education at the specialist level—research component.

Research component	1. Be proficient in the methodology of literature searching for a scientific project and report. 2. Be competent in posing pertinent research questions and in formulating hypotheses. Be knowledgeable in research design and in the undertaking and communication of a research project. 3. Have basic understanding of scientific statistical methodology. 4. Have the competence to actively participate in and critically contribute to a research project. 5. Know how to analyse raw data of a scientific study and evaluate its results. 6. Be competent in reporting outcomes of a research project in form of a manuscript amenable for publication in an English language, international, peer-reviewed, scientific journal. 7. Be proficient in orally communicating, presenting and defending all aspects of a research project: scientific background, hypothesis, design, materials and methods, statistical methodology, results and conclusions.

training (VET). These fields are subject to major changes in content, but also in format and delivery, as well as to underlying legal frameworks and regulations. Three reviews were commissioned and consolidated in a single WG3 manuscript with three sections (Meyle et al., 2024). The first section, directed by Joerg Meyle, discussed CPD with a special focus on formalized, structured, degree-bearing VET. The work addressed the European Bruges/Copenhagen framework for VET with its different components, including accreditation, contents, formats (in-person, hybrid, on-line) as well as part-time or full-time study models, including a discussion of possible 'stairway training' or 'escalator' models. A second section, led by Lewis Winning, explored the current impact and possible future role of the 2018 classification and the CPGs on CE/CPD/VET on periodontology and other disciplines. A third section, led by France Lambert, explored CPD/VET offerings for the management of peri-implant diseases.

6.1 | Regulatory background in Europe for training programmes of CPD/VET

6.1.1 | What is CPD?

CPD is an umbrella term describing all efforts to update knowledge and skills in a working professional. The aim of CPD is to maintain, update and, if desired, broaden professional knowledge, understanding, competencies and skills to continuously improve patient care (Barnes et al., 2013; Ucer et al., 2014). It is essential and required for every oral health professional to meet, maintain and upgrade high professional standards, irrespective of individual training levels.

There is a wide variety of CPD educational pathways in periodontology and in implant dentistry, ranging from product training organized by companies to multi-year academic postgraduate programmes. Differences among them are mainly identified in the following areas: the

duration of the programme (from a few hours to multi-year academic programmes), the organization of the programme (e.g., provided by companies, scientific organizations, national societies, private institutions and universities), content/learning outcomes (basic, specific to comprehensive), educational methods (e.g., theoretical, hands-on training, clinical training and/or mentoring), and mode of instruction (face-to-face teaching, blended teaching and learning, and other online formats).

6.1.2 | What are the principles of VET in Europe and how does it relate to CPD?

VET programmes form a specific subset of CPD, organized as modular, structured or credit-bearing, and offer externally accredited qualifications that can be flexibly reached by learners based on their professional experience. VET is an initiative developed under the commission of the European Union aiming towards professional improvement by a structured modular process consisting of work-based learning, which is a way for professionals to further develop their potential. The work-based component contributes substantially to developing a professional identity and can boost the professional confidence of the learners (Cedefop., 2010).

VET is based on the Bruges/Copenhagen process and complements the Bologna process governing University-based primary education (UG programmes and PG full-time programmes).

VET programmes are increasingly structured into smaller modules or units. There is evidence that several countries have introduced more flexible approaches, allowing learners to accumulate smaller parts of qualifications that are assessed separately (Cedefop, 2023).

6.1.3 | What are the key advantages of VET programmes for workforce development today?

There is a clear discrepancy in Europe between the demonstrated high prevalence of periodontal diseases (Aimetti et al., 2015; Holtfreter et al., 2010; The Economist Intelligence Unit, 2021) and the low volume of periodontal treatment delivered. Using the percentage of the average income of a general dentist that originates from periodontal procedures as a surrogate metric of the low volume of periodontal therapy provided, this amounted to less than 10% in Germany (National Association of Statutory Health Insurance Dentists, 2020) or Sweden (Swedish Quality Registry for Caries and Periodontitis, 2022).

The reasons for this limited volume of periodontal care provided are numerous. It is apparent that an increase in the number of dental professionals with competence in periodontology will increase the volume of periodontal care provided to the European population.

The provision of VET programmes is not limited to universities and/or professional societies. The benefits of VET are flexibility and part-time involvement in life-long learning in a structured modular plan with a clearly defined evaluation process by the institutions. In addition, the VET concept reduces the risk of labour exclusion because it allows dentists to improve their practical skills without interrupting their regular professional activity.

The main disadvantage of VET programmes is the common lack of structured mentorship as well as clinical training experiences mostly based on preclinical models.

6.1.4 | How many levels are covered by the European qualifications framework? To what professional levels in dentistry and periodontology do they relate?

In the European Qualification Framework (EGF), eight levels have been defined. Level 6 is related to a graduated dentist, level 7 to a master of science degree holder in periodontology, and level 8 to a specialist in periodontology.

6.1.5 | How should VET programmes be accredited and governed to ensure appropriate quality standards?

VET programmes are typically externally accredited by accreditation agencies. In addition, WG 2 envisions that programmes in periodontology/implant dentistry should follow certain minimum standards set out by the EFP.

6.2 | Role of the EFP/AAP 2018 classification scheme and the EFP S3-level CPGs in periodontal CPD and VET

6.2.1 | Do we believe the 2018 EFP/AAP classification scheme and the EFP S3-level guidelines should be used in education on the CPD/VET level? Is there any evidence that they are actually used in this setting?

The answer is yes. We endorse the use of the 2018 classification scheme (Papapanou et al., 2018) and EFP S3 level CPGs (Herrera et al., 2022, 2023; Sanz et al., 2020) in periodontal CPD and VET programmes. CPD/VET providers should be aware that individual countries may have their own implementation of the CPG frameworks (West et al., 2021). The EFP and national periodontal societies have taken a lead in dissemination and implementation including CPD activities. However, evidence for its formal integration into VET schemes is uncertain.

6.2.2 | Which parts pose difficulties in teaching on this level? Why?

Beyond the didactic content of the CPD/VET programme, the support a clinician receives when they return to their practice is important. Therefore, the design of such programmes should incorporate interactive processes such as audit and feedback of clinical application by the learner of the 2018 classification scheme (Papapanou et al., 2018) and EFP CPGs (Herrera et al., 2022, 2023; Sanz et al., 2020) and could potentially

involve in person assessment or utilize modern technologies where appropriate. In addition, the introduction of the stage IV periodontitis CPG (Herrera et al., 2022) requires that a higher level of knowledge in restorative dentistry, orthodontics and functional aspects or oral rehabilitation be incorporated in the CPD/VET curricula.

6.3 | Addressing implant dentistry and the prevention and management of peri-implant diseases as a major component in CPD and VET programmes in periodontology and/or implant dentistry

6.3.1 | Should periodontology be addressed in structured VET-level implant dentistry programmes, and vice versa?

The answer is yes. Periodontitis is a recognized risk factor for the development of peri-implant diseases. Periodontal treatment should be the first step of implant therapy as a primordial prevention of peri-implant diseases (Herrera et al., 2023). Furthermore, proficiency in the surgical aspects of implant dentistry is fundamental in the practice of contemporary periodontology; therefore, appropriate content should be included in structured programmes in periodontology.

6.3.2 | How do periodontology and/or implant dentistry CPD/VET programmes address the management of peri-implant diseases?

In non-credit-bearing CPD, there seems to be a lack of attention to the detection of early signs of peri-implant disease and to the treatment of peri-implant mucositis (Meyle et al., 2024).

Structured VET programmes in periodontology and/or implant dentistry typically address the long-term maintenance of implants as defined in the current recommendations in the implant dentistry curriculum (Meyle et al., 2024). However, enhanced/updated content may be required.

However, many implant dentistry programmes do not include adequate content on (i) patient education and motivation and (ii) promotion of professional periodontal and implant supportive care.

Conversely, periodontal and joint periodontal/implant programmes appear to focus more specifically on the management of peri-implant diseases, without adequate emphasis on aspects related to the primordial prevention of peri-implant diseases.

6.3.3 | What competencies are expected for the different CPD/VET programmes in periodontology and/or implant dentistry regarding the management of peri-implant diseases?

In view of the recent S3-level CPG for the management of peri-implant diseases, curricula addressing implant dentistry may require updating.

There is a clear need for CPD addressing peri-implant supportive care, the early detection of signs of peri-implant disease and the treatment of peri-implant mucositis by the entire team of dental professionals, with a specific focus on hands-on/clinical training.

In VET programmes focusing on implant dentistry, we recommend the inclusion of content related to the management of peri-implant diseases.

In addition, we recommend stratification of learning outcomes according to levels of complexity (basic, advanced, complex) and linking those to specific VET qualification levels.

6.4 | Proposal for VET programmes in periodontology

6.4.1 | Which levels are suggested for part-time VET in periodontology in Europe?

A part-time VET programme should conform with the current European regulatory frameworks, that is, the Bruges/Copenhagen Process, and therefore be designed using a modular structure (Cedefop, 2023).

A proposed VET qualification structure in periodontology is presented Figure 2, which is based on levels 6–7 of the EFQ. Specifically, for dentists with a special interest in periodontology, we envision at least three different steps for further professional qualification, in an escalator model. The steps of the VET escalator include a basic (at least 20 ECTS/ECVET), a further (at least 40 ECTS/ECVET) and an advanced level (at least 60 ECTS/ECVET) on level 7 of the EQF. These are often represented by the academic degrees of Postgraduate Certificate (PGCert), Postgraduate Diploma (PGDipl) and Master of Science (MSc), respectively.

6.4.2 | How do these levels relate to specialist education?

These programmes differ significantly from specialist training programmes on level 8 of the EQF by not offering continuous direct supervision of clinical practice. They often largely rely on pre-clinical models of teaching and case documentation, rather than on direct and continuous supervised clinical practice on patients. Furthermore, they do not meet all competencies and learning outcomes of an EFP-accredited specialist education. Thus, VET programmes provide educational experiences below the specialist level and cannot lead to an EFP-accredited specialist qualification.

6.4.3 | What are the proposed learning outcomes for these periodontal VET qualifications? How should these comply with the learning outcomes in UG as well as PG education?

The learning outcomes of the VET programmes on the three different escalator levels are based upon the UG learning outcomes (Figuero

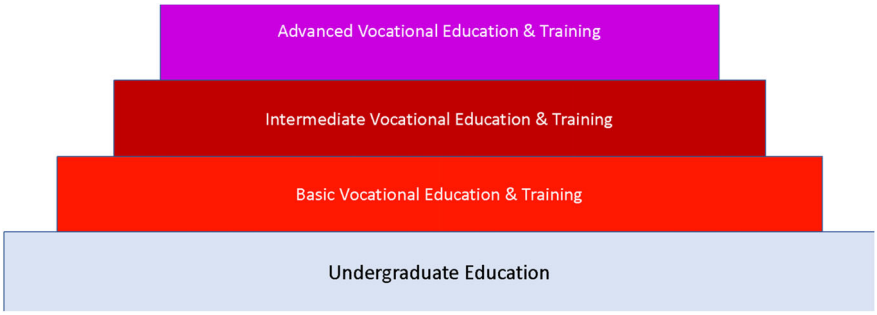

FIGURE 2 Escalator structure of vocational education and training (VET) in periodontology. For dentists with a special interest in periodontology, the consensus report envisioned three different steps building on each other in an escalator model: the steps of the VET escalator include a basic (at least 20 ECTS/ECVET), a further (at least 40 ECTS/ECVET) and an advanced level (at least 60 ECTS/ECVET) on level 7 of the EQF. These are often represented by the academic degrees of Postgraduate Certificate (PGCert), Postgraduate Diploma (PGDipl) and Master of Science (MSc), respectively.

et al., 2024) and build upon those. The learning outcomes for specialist education (Goldstein et al., 2024) are significantly broader than those and are not directly mapped.

See Table 6 for a detailed list of the proposed learning outcomes for the three VET levels.

6.4.4 | How are the technical skills of the VET learners assessed?

Assessment of technical skills is typically ensured by pre-clinical exercises, by documentation, including reflection of clinical cases from the learners' professional environments, and in some cases, through direct clinical supervision of the learners by an instructor.

6.4.5 | How should the learning outcomes in these courses be evaluated?

According to the regulations governing VET, appropriate assessments, typically a mix of formative and summative assessments, are required for each individual modular unit to test knowledge and skills, enabling the required flexibility of studying for the professional learner. The choice of form and timing of assessments allows flexibility and individualization of the programmes (Cedefop, 2023).

6.4.6 | What are the minimum requirements for teachers/instructors on VET-level courses in periodontology and implant dentistry?

The minimum level for teachers in VET-level courses is an advanced level of training in periodontology and implant dentistry, in combination with significant experience in their fields of expertise. Ideally, clinical teachers should be specialists and the course lead needs to have training at the specialist level in periodontology.

6.4.7 | Is there a possible role for the EFP in the endorsement of VET-level courses?

VET programmes in Europe are typically formally externally accredited by accreditation agencies regulated by the ENQA (European Association for Quality Assurance in Higher Education, formerly the European Network for Quality Assurance in Higher Education).

In addition, VET programmes in periodontology/implant dentistry should follow certain minimum standards set out by the EFP (Table 6).

6.4.8 | What are the recommendations for maintaining a certain skill level once having successfully completed a VET course?

Graduates of VET-level courses should maintain their skill levels by regular practice and appropriate CPD.

7 | WG 4: EDUCATION METHODS

Teaching and learning are distinct but critically linked educational concepts that were traditionally perceived as sequential, with the former driving the latter. However, modern educational theory embraces a circular relationship between the two, whereby the ability to learn is, in part, determined by the nature and quality of the teaching, while learning patterns and approaches in turn drive teaching methods and technologies, thus forming a continuous, non-linear and complementary relationship. This concept has come to the fore since the first European Consensus Workshop on Periodontal Education in 2009 (Sanz & Chapple, 2010). Currently, with generation-Z students who have grown up in a digital era, the sheer volume of available information encourages 'soundbite' learning. In addition, evolving digital technologies demand innovation and modernization of traditional didactic methods of information delivery. The concept of blended learning was promoted in the 2009 Workshop

TABLE 6 Learning outcomes of vocational education and training (VET) programmes in periodontology based on levels at graduation (see Section 6).

No.	Domain I: Professionalism	Graduation	Basic	Intermediate	Advanced
1.1	**Ethics**				
1	Apply the moral and ethical standards involved	A	A	A	A
2	Place the patient at the centre of care	A	A	A	A
3	Obtain informed consent by providing adequate information	C	A	A	A
4	Respectful approach to the environment	C	A	A	A
1.2	**Regulation**				
1	Minimize possible health risks	A	A	A	A
2	Comply with the legislative and administrative processes	A	A	A	A
1.3	**Professional behaviour**				
1	Demonstrate practical skills	A	A	A	A
2	Integrate contemporary knowledge	K	A	A	A
3	Use appropriate professional behaviour	A	A	A	A
4	Reflect own decisions, actions and performance	AN	AN	AN	AN
	II: Safe and Effective Clinical Practice				
2.1	**Evidence-based practice**				
1	Use evidence-based knowledge	A	AN	S	E
2	Evaluate critically the validity of claims	E	E	E	E
2.2	**Management and leadership**				
1	Implement team work and leadership skills	A	A	AN	E
2	Identify, manage and minimize adverse events	A	AN	S	E
2.3	**Teamworking and communication**				
1	Communicate effectively, interactively and reflectively	A	AN	S	E
2	Provide relevant information	C	A	AN	S
3	Generate a patient–dentist relationship	A	A	A	A
4	Recognize when and how to share information	C	C	A	A
2.4	**Audit and risk management**				
1	Carry out a safe clinical practice	A	AN	S	E
2.5	**Professional education and training**				
1	Promote time management skills	A	AN	S	E
2	Recognize their own limitations	A	AN	S	E
3	List available career choices	A	AN	S	E
4	Generate self-learning	A	AN	S	E
	III: Patient-centred care				
3.1	**Application of the scientific basis in periodontal/peri-implant healthcare**				
1	Scientific basis of periodontal and peri-implant health	K	A	AN	S
2	Aetiology and pathogenesis of periodontal and peri-implant diseases	K	A	A	AN
3	Aetiology and pathogenesis of halitosis	K	A	A	A
4	Associations between periodontal or peri-implant diseases	K	A	AN	S
5	Healing processes following tooth extraction	K	A	AN	S
3.2	**Gathering clinical information for the diagnosis**				
1	Obtain and interpret a medical and dental history	A	AN	S	E
2	Examine the subject extra- and intra-orally	A	AN	S	E
3	Carry out a comprehensive periodontal/peri-implant assessment	A	AN	S	E
4	Determine the necessity of conducting radiological diagnoses	A	AN	S	E
5	Select the cases that may benefit from additional diagnostic techniques	A	AN	S	E
6	Apply the current classification	A	AN	S	E

(Continues)

TABLE 6 (Continued)

3.3	**Care planning**				
1	Assign the individual (tooth/implant) and general prognosis	A	A	A	A
2	Generate alternative care options	K	A	AN	S
3	Inform the individual about the diagnoses, prognoses, etc.	A	AN	S	E
4	Develop a comprehensive prevention programme	A	AN	S	E
3.4	**Establishing and maintaining periodontal/peri-implant health**				
1	Use validated risk factors control protocols	A	AN	S	E
2	Assess individual's oral hygiene	A	AN	S	E
3	Carry out supra- and sub-gingival/sub-marginal instrumentation	A	AN	S	E
4	Flap surgery	K	C	A	AN
5	Advanced flap surgery	K	K	C	A
6	Surgical implant therapy	K	C/C	A/C	AN /C
7	Management of peri-implant diseases	K	C	A	AN
8	Manage acute lesions	A	AN	S	E
9	Evaluate the individual response to therapy	A	AN	S	E
10	Determine the indications and identify the objectives	A	AN	S	E
11	Carry out infection control and pain management	A	AN	S	E
12	Implement personalized supportive periodontal/peri-implant care	A	AN	S	E
	IV: Dentistry in Society				
4.1	**Dental public health**				
1	Identify the social determinants of health	K	A	AN	S
2	Comply with and contribute to dental public health	A	AN	S	E
3	Recognize the epidemiology of periodontal/peri-implant diseases	K	A	AN	S
4	Identify the structure and components of healthcare systems	K	A	AN	S
5	Recognize the importance of collaboration	K	A	AN	S

Note: The learning outcomes, following Bloom's taxonomy, are characterized by the different levels (in ascending order): **K**nowledge, **C**omprehension, **A**pplication, **AN**alysis, **S**ynthesis and **E**valuation.

for CE (Chapple et al., 2010), also known as CPD (Field et al., 2023). However, the diverse array of educational platforms and methods of delivery now available have created the need to re-evaluate educational methods also at UG and postgraduate specialist training (PG) levels.

A major driving force behind new developments in educational methods was the SARS-CoV-2 pandemic, which abruptly closed face-to-face (F2F) teaching in early 2020 and forced educational programmes at all levels online. A plethora of learning and assessment platforms and approaches developed and permitted non-practical elements of periodontal education to continue, but only for those who had access to the Internet and computers capable of connecting to on-line resources. Some technologies offered a superior experience and outcome to traditional educational methods by encouraging active student learning rather than a passive approach via the traditional lecture. On-line synchronous (live) and asynchronous (recorded) approaches were employed with varying levels of engagement and feedback, but the mantra at the time of the pandemic that 'education will never be the same again' was perhaps overstated, and remote approaches that eliminated peer interaction and live engagement failed to reliably deliver the enhanced learning experience that was promised. Nevertheless, the pandemic created a watershed and an opportunity to reflect via pedagogical research on the modernization of curricula and educational delivery and assessment, and to question established dogmas. An example of the latter is the misconception that students' attention spans are only 10–15 min long (Hartley & Davies, 1978), an erroneous notion that has little or no data to support it (Bradbury, 2016).

Education for oral healthcare professionals carries the added challenge that, in addition to critical thinking skills and the acquisition of basic knowledge and its application, clinical, social (e.g. empathy), professional (e.g. candour, discretion) and practical skills must be acquired. The optimal blending of educational methods encompasses a matrix of variables (Figure 3) and, therefore, WG 4 of this second European Consensus Workshop on Education in Periodontology focused on educational methods, with information derived not only from the field of periodontology, but also from dentistry in general and from medicine, where applicable. Educational methods covered included the delivery and assessment of knowledge and skills appropriate to UG, PG and CPD. The primary aim was to understand the relative merits of different educational approaches (F2F, remote/virtual, hybrid, blended, student-centred) for each education level, and the secondary aim was to explore which specific educational methods within each approach can be recommended in periodontal education.

Three scoping reviews were commissioned, and consolidated in one WG4 paper with three sections (Preshaw et al., 2024). The first scoping review (Section 1), directed by Bruno Loos, aimed to explore current attitudes and potential adjuncts to traditional F2F lecturing at UG, PG and CPD levels. A literature search was performed, covering 3 years prior to and post the SARS-CoV-2 pandemic. Following the search, 52 papers were included in the analysis, with the majority (45) strictly focusing on UG education. Sixteen focused on student-centred methods additional to, or replacing, F2F teaching, 16 on the virtual classroom (VC) as an alternative to the traditional 'live' F2F lecture and 12 on pre-clinical and clinical educational teaching methods for dental skills. A second review (Section 2), led by Christoph Ramseier, aimed to assess the current state of knowledge of the use of virtual learning methods and programmes in UG, PG and CPD education in periodontology and to identify best practice in virtual periodontal education and assess relevance, impact and feasibility in dental curricula. A literature search was performed up to 2023, and 48 papers were selected, the majority focusing on online learning (26), with 6 studies addressing haptic learning and 6 the use of VR. The third review, commissioned to Philip Preshaw and co-workers (Section 3), aimed to evaluate the impact and feasibility of blended learning (including teaching delivery and assessment) in periodontology at UG, PG, and CPD levels. A literature search was performed up to June 2023. The search led to the selection of 55 papers, 49 strictly focusing on UG, 3 on PG, 2 on both UG and PG and 1 on CPD.

dependent upon individual learner preferences and the context of the material being studied (Bock et al., 2021; Kemp & Grieve, 2014; Raturi, 2018). Importantly, F2F teaching can be successfully and usefully enhanced by judicious use of technologies at various points along the learner's journey. This is the concept of blended learning.

It is recognized in higher education that numerous methods can be employed to enhance F2F teaching, but these must be grounded in sound educational practice. ADEE recommends that complex clinical tasks are deconstructed by educators into simpler tasks, which can then be re-built in complexity longitudinally across a programme (Field et al., 2021). This approach reinforces the concepts of constructive alignment and deliberate practice, but can also ensure that teaching resources are allocated effectively and that students are exposed to a range of synergistic teaching methods (blended learning). This is particularly important for 'threshold concepts' (Davies et al., 2023). When understood, threshold concepts fundamentally change a student's approach to clinical practice. Increasingly complex case studies are one example of how this can be implemented. Figure 4 has been developed to assist educators in attributing appropriate teaching and assessment activities to learning outcomes.

While there is a definite place for F2F teaching (Preshaw et al., 2024) in contemporary education, additional approaches can be used to further improve student-centred learning (Table 7). These largely centre around methods to encourage and develop active student learning, including the development of understanding, knowledge retention, clinical skills development and reflective learning.

7.1 | Face-to-face methods

7.1.1 | What additional methods of teaching and learning can enhance F2F provision?

Recent systematic reviews report that F2F teaching is preferred by students in higher education. This is, however, a generalization and is

7.1.2 | Is there a role for the traditional face-to-face model of teaching and learning in the 21st century?

Traditional F2F models offer a social environment. Students have the opportunity to interrupt and interact, contributing to the active nature

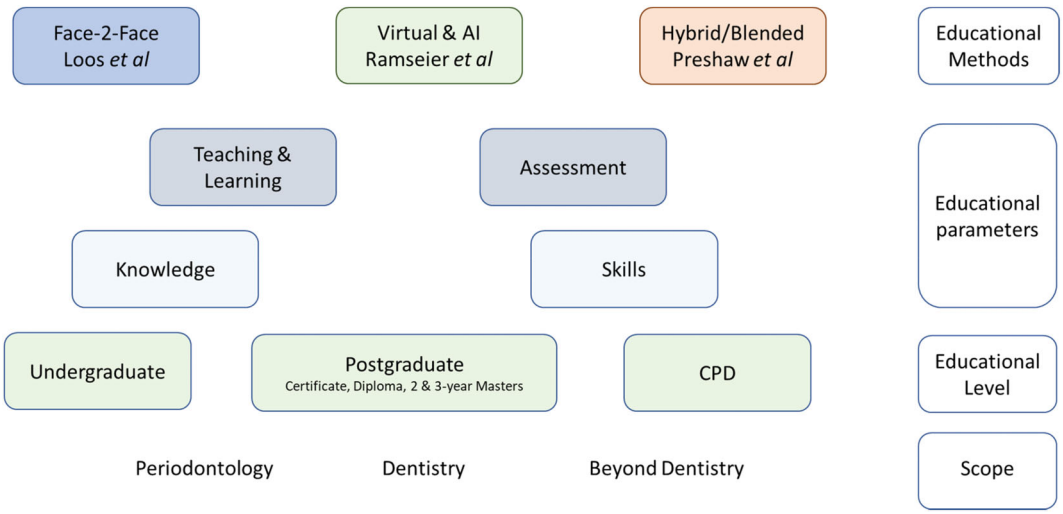

FIGURE 3 Framework of concepts underpinning consensus report on educational methods.

of their learning, thus gaining benefit from interactions with teachers and peers in the classroom.

What are some of the key challenges for effective F2F teaching and learning?

- Teacher credibility (e.g., via provision of mandatory teacher training, professional development, academic standing).
- Engaging the cohort.
- Maintaining interest and interaction.
- Effective student orientation/on-boarding (explaining the educational process and expectations).
- Managing lateness, attendance, active participation and professional conduct.
- Availability of appropriate technical resources (e.g., recording of live lectures for subsequent student review).
- Allocation of physical space.

How can the F2F model be enhanced by blended learning approaches?

Live interaction is very important in UG education, particularly as students gain experience as independent learners and mature academically. Over time, students should become more autonomous in directing their own learning, and the role of the teacher should transition to one of facilitation. Any method that further activates student engagement improves interaction between teachers and students and, within student cohort, will improve educational outcomes. Examples (Table 7) include the use of

- on-line learning platforms/environments;
- discussion forums;
- virtual patients;
- interactive video lectures/tutorials;
- quizzes, and other direct engagement activities.

Reported benefits include the following (Stone & Perumean-Chaney, 2011; Victor et al., 2023):

- Removing the physical and virtual boundaries relating to live attendance, giving students flexibility in their learning journeys.
- Higher student performance.
- Higher student satisfaction.
- Cost effectiveness in use of teaching resources.
- Use, in particular, for improving inter-professional education.
- Increased speed for students to achieve competency.
- Improved social networking.

Recommendations include (modified from Stone and Perumean-Chaney (2011)) the following:

- Clear and explicit learning outcomes, categorized into levels of difficulty.
- Logical and consistently organized on-line material.
- Teacher and student training on how to use/interact with on-line platforms/tools.
- Multiple strategies for the submission of student work.

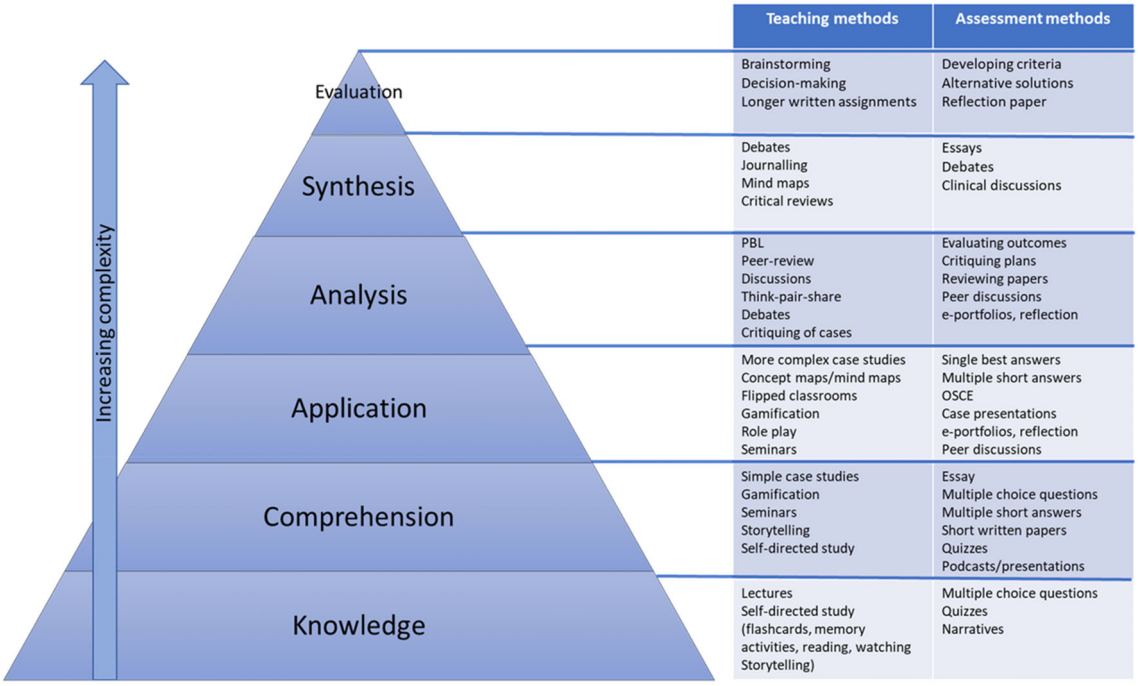

FIGURE 4 Examples of teaching and assessment methods mapped to action verbs for learning objectives at each level of Bloom's taxonomy to support purposeful learning in oral health professional education (conceived by Association for Dental Education in Europe [ADEE], designed by ADEE and Working Group 4 of the workshop).

TABLE 7 Interactive student-centred methods, context and outcomes, additional to or replacing face-to-face (F2F) teaching.

Method	Context	Outcome	No. of studies
Active learning classroom (ALC) or technology-enabled learning classroom (TELC)	Following asynchronous lecture access to acquire foundation knowledge, appropriate technology is used to actively engage students in a learning exercise/skills development, in a supervised environment	One study demonstrated ALC and TELC lead to higher grades by improving problem-solving skills and conceptual understanding	1 (Gordy et al., 2019)
Problem-based learning (PBL)[a]	PBL is a student-centred teaching philosophy in which the learning is driven by the students solving an authentic problem, often in small groups with a facilitator	Several studies demonstrate student satisfaction and improved preparedness for clinical practice. However, in one study students ranked PBL approaches as non-superior to F2F	4 (Bai et al., 2017; Oderinu et al., 2020; Paudel et al., 2021; Sekhon et al., 2022)
Case-based learning (CBL)[a]	Case-based approaches are methods where clinical cases are used to provide a realistic context to allow students to develop and apply their knowledge and reasoning skills	A positive impact was reported for student confidence and learning outcomes	2 (Chowaniec et al., 2018; Persky et al., 2017)
Peer-assisted learning (PAL)	Students learn from each other as peer learners	PAL was not shown to be superior to F2F in one study in orthodontics	1 (Ehsan, 2020)
Team-based learning (TBL)	Utilizes on-line platforms such as CANVAS and Blackboard for self- preparation, followed by an 'in-class' readiness test, then application via a case example. The teacher facilitates the team-based learning	Student feedback indicates this three-step model encourages self-directed learning and critical thinking skills	2 (Nishigawa et al., 2017; Park et al., 2019)
Think–Pair–Share (TPS)	Students individually consider a question set by a tutor and pair up to discuss and develop a joint answer that is presented to the tutor and the other student pairs.	TPS when combined with 'storytelling' was deemed superior to traditional F2F lectures	1 (Ganatra et al., 2021)
Jigsaw learning (JSL)	Tutors select group members on the basis of heterogeneous characteristics (e.g., race, socio-economic status, intellect) and assign PBL study topics on a group basis	There was no difference in pre- and post-test outcomes; however, retention was slightly greater with the JSL model	1 (Sagsoz et al., 2017)
Flipped classroom (FC)[a]	An approach where students acquire knowledge before a synchronous teaching event (e.g. books, video, podcasts) and use formal teaching time to discuss, evaluate and apply concepts through interaction with each other and a teacher. Feedback can be incorporated (e.g., quiz).	Superiority was demonstrated in one prosthetics course, one periodontal course on the 2018 classification and one orthodontic class	3 (Crome et al., 2021; Sivarajan et al., 2021; Wang et al., 2021)

Note: Studies are post 2016.

[a]Association for Dental Education in Europe (ADEE) glossary of terms (Davies et al., 2023).

- Clear opportunities for clarification of student misunderstandings or misinterpretation.
- Maintenance of the published course schedule, with fewer amendments.
- Access to course material during instructor's absence.
- Accessibility of material to students as they progress through the programme.

7.1.3 | What are the key learnings from the educational innovations necessitated by the SARS-CoV2 pandemic?

The pandemic resulted in rapid adoption of VCs, which were embraced by both students and educators. Key learnings are as follows:

- Quality technology alongside reliable and speedy internet access are essential.
- Adaptation of traditional F2F teaching delivery is required to optimize student-centred learning in VCs.
- Interactions with the teachers and peer-to-peer learning are negatively impacted in VCs. Students reported a strong desire to revert to live F2F teaching despite the successful introduction of VCs during the pandemic.
- Additional methods to engage students, such as case-based learning (CBL), PBL and flipped classroom (FC), can be successfully combined with VCs.
- Students were especially anxious about their clinical learnings in VCs because they felt that the reduction in F2F teaching could negatively impact development of professional skills.

7.2 | Virtual methods

7.2.1 | Which virtual learning methods, both on-line and off-line, have been evaluated via pedagogical research and where may they integrate into a contemporary curriculum in UG, PG and CPD?

What is the value of VCs in periodontal education?

There is evidence from studies of UG programmes for the value of VCs in periodontal education. Both distance learning capabilities and cost effectiveness make VCs a considerable opportunity, providing access to a wider range of scholarly and clinical expertise. VCs support flexible scheduling and resource sharing and accommodate different student learning preferences. Synchronous sessions facilitate direct teacher interaction and, when integrated with interactive tools such as quizzes and survey polls, increase engagement and adaptability of learning, making VCs a valuable component of periodontal education.

What is the value of simulation techniques in education in periodontology?

Simulation techniques such as haptics, VR and AR are emerging tools in periodontal education. Haptics and VR have been shown to improve clinical skills when combined with conventional learning. While current barriers include high cost, the need for extensive trainer customization and effective feedback mechanisms, these methods offer unique advantages. These include personalized haptic simulations, already familiar to periodontal educators through implant planning software. Additionally, they could reduce reliance on cadaveric/animal models and peer-based training. They also offer reproducible and unbiased assessments of competency.

It is noteworthy that lower cost and more widely accessible simulations are also being employed, using augmented or immersive technologies, although with limited evidence of impact. As these simulation technologies evolve, their integration into all levels of periodontal education could revolutionize future training and assessment.

What is the value of virtual methods for communication training, including patient encounter simulations in education in periodontology?

Although evidence is limited, virtual training offers potential in periodontal education by facilitating the acquisition and development of communication skills such as oral hygiene motivation, smoking cessation and patient history-taking. For undergraduate students, these tools can be instrumental in building these skills, while for qualified dentists they serve to refine and enhance existing skills. In addition, these methods may enhance dental practice teamworking.

What is the likely future role of AI in education in dentistry and what are the associated challenges?

Given the lack of research, the future role of AI in periodontal education is still speculative. However, it is likely that a dramatic shift in educational approaches and curriculum integration will occur. AI could become central to areas such as diagnostic image interpretation, among others, enhancing in-depth education and accuracy in clinical diagnostics. At the same time, there are significant challenges associated with its implementation. The potential for misdiagnosis leading to incorrect treatment, misuse, fraud or academic misconduct should not be underestimated. Hence, educators should guide students on the appropriate use of AI to ensure that it enhances rather than undermines their learning experience.

7.2.2 | What are the challenges for virtual educational technologies that need addressing before their universal uptake can be recommended?

The implementation of virtual educational technologies in periodontal education is challenging and requires careful consideration before widespread adoption can be recommended. Academic institutions have a key role to play in addressing and overcoming barriers, including continued adherence to conventional teaching methods. A critical component is the establishment of a comprehensive 'train the trainers' programme involving equipping educators with appropriate pedagogical and information technology (IT) skills required to use digital resources effectively. When implementing virtual educational technologies, it is important to ensure that they integrate effectively to achieve the learning outcomes without excessively increasing students' workload. Furthermore, introduction of virtual educational methodologies may present financial implications for both institutions and students. Issues related to cultural diversity and privacy regulations must also be addressed to realize the full potential of these evolving technologies.

7.3 | Blended learning

7.3.1 | How effective are blended methods of learning and teaching in undergraduate education?

How do students and staff perceive blended approaches to learning and teaching respectively, and what are the associated levels of satisfaction and impact on well-being?

High levels of student satisfaction have been reported in papers that assessed blended learning approaches, including from some studies that compared blended methods with traditional lecture-based teaching. It should be noted, however, that these findings were not universal, with some studies reporting similar levels of satisfaction between blended learning and lecture-based learning. Specific aspects of blended learning found to be better perceived by students included feedback, support and engagement, as well as increased student perceptions of learning, engagement, motivation, critical thinking, problem solving and preparedness. It is important to note that students also highlighted the importance of the F2F aspects of blended approaches, particularly in relation to the learning of more complex topics, especially clinical material, and the opportunity for

teachers to check students' understanding. Student preference for blended approaches was also confirmed in the small number of studies dealing with periodontal education. There is limited evidence currently to evaluate the impact of blended teaching on student well-being.

There is some evidence from a limited number of studies to support staff satisfaction with blended teaching methods. However, there are also concerns regarding student attendance and participation in the on-line elements of blended approaches.

Does student performance in the assessment of knowledge improve with blended teaching versus traditional F2F teaching approaches?

There is a mixed pattern of results from studies that have evaluated assessment outcomes following blended teaching versus traditional F2F teaching, and the available literature is highly heterogeneous. Overall, the data currently support the contention that blended teaching is likely to promote active learning, which may therefore result in higher assessment grades for knowledge-based assessment. It should be noted that most studies did not focus on higher order learning such as clinical reasoning and critical evaluation, and also did not assess long-term knowledge retention (Figure 4).

Only one identified study related to dentistry evaluated blended assessment methods. This study reported no impact on the anxiety level of students between on-line or in-person exams, although students did report concerns about potential cheating with on-line assessment.

How effective are blended methods for skills acquisition in UG education?

No research data were identified that evaluated blended methods for skills acquisition in periodontal UG education; however, in other dental disciplines, student evaluation of blended teaching for skills acquisition was positive. Studies reported that on-line videos benefitted learning skills, understanding and preparation for performing clinical procedures. A majority of studies reported higher skills assessment outcomes following blended teaching approaches, although the results were not consistent.

7.3.2 | Is there a role for blended methods of teaching and learning in postgraduate specialist programmes?

A few studies were identified that have evaluated blended methods for PG programmes. On-line teaching was perceived to increase efficiency while recognizing that the balance between on-line and F2F teaching needs to be considered and should take into account the training needs of the students and the intended learning outcomes. Evidence is limited regarding the extent to which blended methods should be used in postgraduate specialist programmes in comparison with F2F methods.

7.3.3 | Is there a role for blended methods of teaching and learning in CPD programmes?

Only one study was identified that evaluated blended methods for CPD programmes in periodontology. Blended methods that involve close working between students and teachers, with clear linkage to the working environment and clinical supervision, can promote effective learning and skills development. Blended teaching methods can be particularly suited to CPD programmes because of the advantages of flexibility, sustainability and work–life balance, as well as relevance to the broader dental team.

7.4 | Summary and recommendations

7.4.1 | Future-proofing teaching and learning

Live F2F teaching will continue to be a highly valued method of dental education by both students and teachers, and its value should be enhanced by using student-centred methods. Well-balanced blended approaches, encompassing an adequate combination of F2F and virtual components, may be considered when designing and implementing programmes, and the balance can differ according to the level of education (UG, PG, CPD) and to the pre-determined competencies/learning outcomes of the subject.

7.4.2 | Conditions for a successful implementation of virtual or blended learning

- Teachers should be trained in virtual and student-centred methods ('train the trainers').
- Experts in educational pedagogy should be available or accessible for dental schools.
- Appropriate resources should be made available for the programme to introduce, develop and maintain the systems and ensure their quality.
- Appropriate resources should be made available for teachers and students.
- It is critical that the adoption of digital and virtual methods of education is driven by their demonstrable educational benefit rather than the availability of the technology and the cost savings realized by the educational provider through the use of alternatives to F2T teaching.

7.4.3 | Perceived advantages of virtual and blended approaches

Virtual and blended approaches

- have been associated with high levels of student satisfaction;
- favour the sharing of resources, courses and experts at local and national levels;

- favour internationalization: courses and resources may be shared among programmes in different countries, and international programmes may be developed;
- favour sustainability;
- favour access to a wider range of scholarly and clinical expertise;
- favour benchmarking, curriculum harmonization and sharing expertise with other programmes;
- are particularly suited to CPD programmes due to the advantages of flexibility, sustainability and work–life balance, as well as relevance to the broader dental team.

7.4.4 | Potential limitations

- The efficacy of virtual methodologies remains to be fully established, and comprehensive data are not available. Caution should be adopted when implementing these methodologies.
- Study loads should be carefully considered, especially for asynchronous learning resources where timetable space for self-study is not assigned, as they may negatively impact student well-being.
- Institutional policies should be revised to consider innovations in education, including those related to learning resources, as well as privacy and legal aspects.
- Economic costs should be assessed both in the short and long term.
- Adaptations and alternatives to traditional F2F teaching require careful consideration at the level of learning outcomes, educator, institute and country, and also cultural diversity.

7.4.5 | Future research recommendations

- For F2F education, the specific methods employed and the impact of the country, continent and culture on the performance of methods additional to or replacing F2F teaching should be evaluated, as well as how training the trainers can impact the efficacy and effectiveness of different learning methods.
- For virtual methods, there is a clear need to work (i) on the standardization of virtual platforms; (ii) on longitudinal evaluations to measure the lasting impact of virtual education on clinical skills and patient care; (iii) on rigorous evaluation of AI to determine their supportive, rather than substitutive function; and (iv) on the challenge of skill transfer from the simulator to the clinical setting, and on the cost/benefit ratio of different simulation technologies.
- For blended learning, further research is required to evaluate the benefits of blended learning (including assessment) for knowledge and skills at UG, PG and CPD levels in periodontology, and the impact of blended methods on student behaviours, approaches to learning, performance, preferences and well-being.

AUTHOR CONTRIBUTIONS

David Herrera, Iain Chapple, Søren Jepsen, Tord Berglundh, Maurizio S. Tonetti, Moritz Kebschull, Anton Sculean, Panos N. Papapanou, and Mariano Sanz, substantially contributed to the conception and design of the project, interpretation of data and drafting and critical review of the manuscript. The EFP workshop participants (listed above) significantly contributed by critically reviewing the consensus report and by participating in the workshop discussions. In addition, ADEE delegates contributed to the higher level discussions relating to pedagogy, and drafting and critical review of the manuscript. All authors approved the final version of the manuscript.

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CONFLICT OF INTEREST STATEMENT

Individual potential conflict-of-interest forms were completed by all participants and are available on file at the European Federation of Periodontology.

DATA AVAILABILITY STATEMENT

Not aplicable.

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