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# O-Health-Edu: A viewpoint into the current state of oral health professional education in Europe: Part 2: Curriculum structure, facilities, staffing and quality assurance

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## Abstract

**Introduction:** Oral health professional (OHP) education is likely to vary across Europe in accordance with an EU directive that is open to broad interpretation. It is not clear how OHP curricula are structured or delivered across Europe. The objectives of Part 2 of this paper series are: (i) to provide an overview of common practices in curriculum structure, the availability of facilities, staffing (faculty) and quality assurance processes and (ii) to consider how the existing programme structures align to stakeholder guidance documents.

**Methods:** A total of 27 questions from a 91-item questionnaire were used for this manuscript. The questionnaire was developed following the Delphi method to establish consensus from a group of experts. Members of the research team and colleagues from other countries in Europe completed a multi-step piloting process. An online data hub was created to allow the respondents to be data controllers and respond to the questionnaire. ADEE member schools ( $n = 144$ ) were invited to provide data.

**Results:** Totally, 71 institutions from 25 European countries provided data between June 2021 and April 2023, which represents a response rate of 49.3% of ADEE members. Data on curriculum approaches, teaching methods, integration of topics of interest, clinical education, staff–student ratios, access to facilities and new technologies, teaching staff (faculty) and quality assurance processes are presented for Primary Dental Degree Programmes.

**Conclusion:** To the best of our knowledge, this series of papers are the first attempts to provide a comprehensive overview of OHP education in Europe. Results showed that the majority of European dental programmes are engaged in providing innovative and scientifically grounded education in order to develop quality future OHPs. Nevertheless, significant variability in the delivery of clinical education across the European OHP schools was notable in this dataset. A comprehensive view of the state

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of OHP education in Europe is not yet *available* but the O-Health-Edu data hub provides a means for all education providers in Europe to contribute data to reach this goal. It is anticipated that the data hub will be updated and *built* upon over time to continually establish a clearer picture of the state of OHP education in Europe.

#### KEYWORDS

dental education, dental hygienists, Europe, oral health professionals, survey

## 1 | INTRODUCTION

The education of oral health professionals (OHPs) is of fundamental importance to deliver equitable and quality oral healthcare in the future.<sup>1</sup> Education providers are strategically positioned to ensure their graduates have knowledge, skills and attitudes that are appropriate to manage the current and future oral health needs of the European population.

The need for data on educational practices in European OHP programmes has been established<sup>2</sup> and gave rise to the O-Health-Edu project.<sup>3,4</sup> While the O-Health-Edu project encompasses all OHP education, this paper will consider curriculum structure for Primary Dental Degree Programmes (PDDPs) and the facilities, staffing and quality assurance measures employed by dental schools.

The curriculum is a challenging construct to define, with research demonstrating a lack of concordance amongst educators in defining the term.<sup>5-9</sup> It has multiple meanings and can be considered in different lights – from a student (receiver) or from educator or institutional (deliverer) perspectives.<sup>10-12</sup> The most expansive definition of the curriculum includes *all* processes that contribute to student learning on a programme of study, these processes may be planned, unplanned or hidden to educators.<sup>7,10</sup> In *Articulate*, a glossary of OHP education terms, curriculum is defined as: 'detail of a particular course of study, including learning outcomes, the students' expected educational experiences, assessments, and formats for learning'.<sup>3</sup> European regulatory and guidance documents tend to focus on the formally delivered curriculum which typically includes study modules, learning outcomes, competences and learning, teaching and assessment methods.

The Annex V3/5.3.1 of the Directive 2005/36/EC provides details of a study programme for dental practitioners and encompasses basic subjects, medico-biological subjects/general medical subjects and subjects directly related to dentistry within the European Union.<sup>13</sup> Aside from defining the minimum programme length, these are the only regulations to support dental schools in developing their curricula.<sup>13,14</sup> The limited regulations at a European-level leave dental education open to interpretation and significant variability unless national competent authorities or regulators provide additional standards.<sup>2</sup> Examples of such practices are the standards imposed by the 'Ministère de l'enseignement supérieur et de la recherche' in France (2013) and the General Dental Council in the United Kingdom (2015), who defined learning outcomes and standards for education providers.<sup>15-17</sup>

At a European level, the Association for Dental Education in Europe (ADEE) has been a key stakeholder in advancing OHP education for over 20 years. Concerns regarding the variability of dental education stemmed from the findings of Shanley et al. in 1997.<sup>18</sup> The ADEE were subsequently involved in the DentEd Thematic Network Projects and commissioned taskforces to engage in pan-European consultation to formulate the outputs:

- Profile and Competences for the European Dentist.<sup>19</sup>
- Curriculum structure and the European Credit Transfer System for European dental schools: part I.<sup>20</sup>
- Curriculum content, structure and European Credit Transfer System for European dental schools. Part II: methods of learning and teaching, assessment procedures and performance criteria.<sup>21</sup>
- Quality assurance and benchmarking: an approach for European dental schools.<sup>22</sup>

These documents were the first attempts to promote the convergence of European dental education and the profile and competences and curriculum content, structure, learning and assessment documents were further updated in the early 2010s.<sup>23,24</sup>

A significant change to the structure of these documents occurred through development of the Graduating European Dentist (GED) in 2017.<sup>25</sup> This suite of documents replaced the previous profile and competences and curriculum content by incorporating the widely recommended learning outcomes approach to curriculum development. The GED currently has four domains and includes contemporaneous recommendations for learning, teaching and assessment.<sup>26-30</sup> All of these documents are now available online (<https://adee.org/graduating-european-dentist>) and are open for development with a dedicated taskforce to manage this process on a regular basis.

The GED provides a framework to support schools in developing their curricula within their own contexts. Increasingly, discipline-specific curriculum frameworks are being published in line with recommendations from the GED and the O-Health-Edu scoping review.<sup>2,25</sup> Some of these are outputs of ADEE Special Interest Groups including pre-clinical operative skills and environmental sustainability.<sup>31-34</sup> Others recent examples of discipline-specific curricula are the European Core Curriculum in Cariology and the European Federation of Periodontology documents.<sup>35,36</sup>

As an integral part of quality assurance procedures, changes to dental curricula are driven by numerous factors, including new

developments in the profession, emerging technology and education rationale.<sup>37-40</sup> With contemporaneous recommendations for learning, teaching and assessment and the emergence of new technology in OHP education, such as virtual reality (VR) simulation, an overview of the uptake of these practices is necessary. There are currently no readily identifiable sources to provide insight into educational practice across European dental schools.<sup>2</sup>

The aim of this two-article series is to present data regarding OHP education from institutions representing a variety of geographical locations across Europe and to establish commonalities and trends. Specific objectives for this paper are to:

- provide an overview of common practices in curriculum structure, the availability of facilities, staffing (faculty) and quality assurance procedures, and
- consider how the existing programme structures align to stakeholder guidance documents.

## 2 | METHODS

This study received approval from the Ethics Committee of the Universitat de Barcelona (IRB00003099, 5th October 2020). Further details regarding the complete questionnaire including instrument development, piloting and recruitment can be found in [Part 1](#) of this series.

A total of 27 questions from the 91-item questionnaire are included in this manuscript, as these referred to curriculum approaches and frameworks (3), teaching methods and integration of topics of interest (2), student opportunities (5), clinical activities, staff-student ratios and frequency of clinical sessions (4), access to outreach practice and anatomical dissection (4), access and location of facilities and technology (2), teaching staff/faculty (3) and quality assurance (4). All questions were written in English, no translations were made available. The questions used in this manuscript are available in the [Appendix S1](#).

The development of these questions followed the Delphi method with successive rounds of discussions until consensus was achieved. The content was shaped by the scoping review and previous curriculum documents as well as topics of interest raised at ADEE meetings.<sup>2,25-31,33,34</sup> The Articulate glossary was written concurrently with the questionnaire and all key words within each question were defined.<sup>3</sup> These terms were then linked to the questionnaire to establish a common understanding and to facilitate completion.

The questionnaire was piloted in multiple stages with members of the O-Health-Edu project, an external quality committee and a group of European OHP academics. Modifications were made to improve quality and clarity. An additional consultation was performed with OHP stakeholders including the CED (Council of European Dentists), the FEDCAR (Federation of Regulatory Authorities), the EDSA (European Dental Student Association) and the ADEA

(American Association of Dental Education). To develop a live and updatable datahub, the questionnaire was uploaded onto the O-Health-Edu website (<https://o-health-edu.org/ohe-datahub-directory>). The datahub allows responding schools to create an account and respond to the questions in the questionnaire. This approach allows individual OHP schools to control, access and modify their data at any time.

All OHP schools in Europe were eligible to provide data for their institution but due to challenges in identification and communication, only ADEE registered schools ( $n=144$ ) were directly invited to register on the O-Health-Edu website. Institutional contacts (either the Head of School/Dean or their designated contact) provided data for their institution. Technical and academic support was available to help institutions in submitting their data. The data reported in this manuscript was collected until the 17th April 2023, although the data hub continues indefinitely with institutions welcome to submit data. Any data provided from institutions outside of the 53 European countries set out in the WHO definition of Europe were excluded.

The data were analysed using descriptive statistics. The IBM SPSS Statistics program (version 26) was used to present the data in counts and percentages. The results were presented in tables, graphs and charts using Microsoft Excel 2017. Due to the small and non-representative sample of the many schools throughout Europe, few comparisons between groups of schools were made. One question had a free-text answer – ‘List the type of processes that are included in your internal quality assurance process’. Content analysis was used to establish frequency of responses for this question.

## 3 | RESULTS

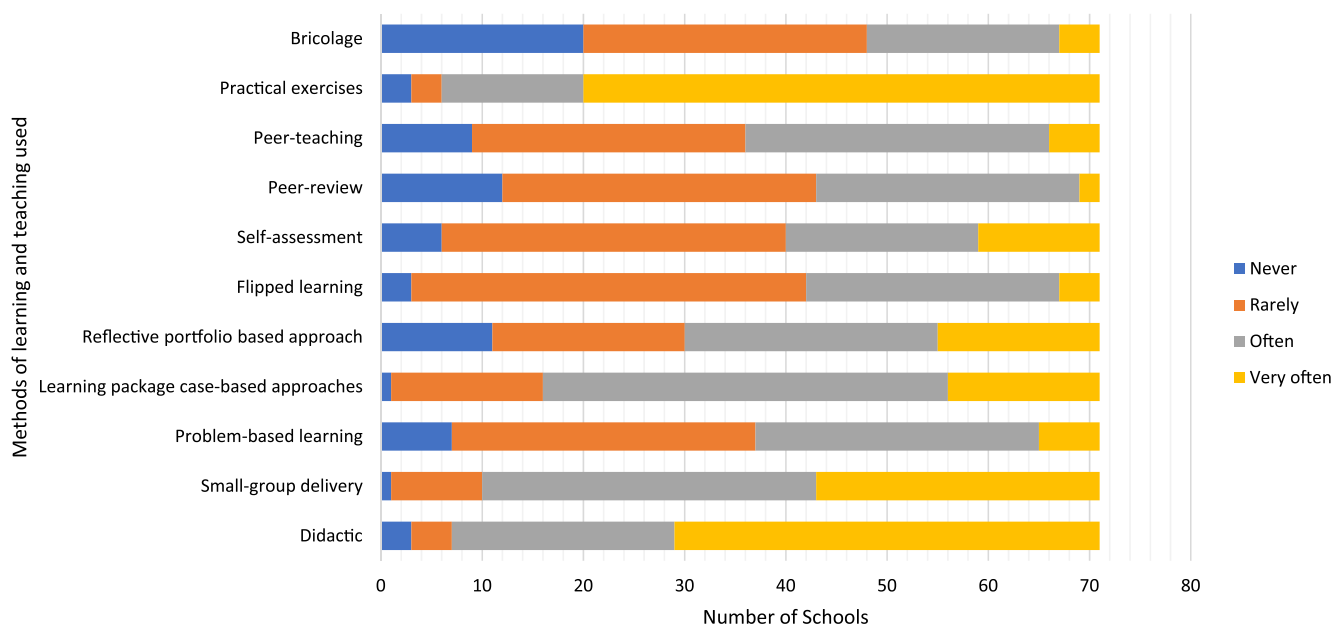
A total of 71 schools from 25 European countries provided data between 8th June 2021 and 17th April 2023. Within these schools, 25 offer dental hygiene programmes. Programme-level data for PDDPs, dental hygiene and postgraduate education as well as the demographics of this dataset can be found in [Part 1](#) of this series. All of the data included within this manuscript relate to PDDPs. In the Articulate Glossary, this is defined as: ‘A course of study resulting in qualification as a dentist’.<sup>3</sup>

### 3.1 | Curriculum approaches and frameworks

Curricula across the 71 dental schools that contributed data are varied with 14 schools (19.7%) using a completely integrated approach, and 27 schools (38%) using a discipline-based approach. The majority of schools ( $n=30$ , 42.3%) report that both approaches co-exist in their curricula. The sources used to guide PDDP curricula are varied and most schools ( $n=65$ , 91.5%) rely on a national framework ([Table 1](#)). Two schools from Spain and one

	Count (n)	Per cent (%)
International framework (Graduating European Dentist)	42	59.2
National framework	65	91.5
Discipline-specific	23	32.4
Own curricula developed within school	44	62.0
Curricula developed by other dental school(s)	12	16.9

**TABLE 1** Sources used to guide curricula for Primary Dental Degree programmes ( $n = 71$ ).



**FIGURE 1** Methods of learning and teaching used within the Primary Dental Degree Programmes ( $n = 71$ ).

each from Malta, Cyprus, Denmark and Israel did not report the use of a national framework. Sixty-two per cent of schools develop their own curricula and 59.2% utilise an international framework – the Graduating European Dentist.<sup>25</sup> From the free-text responses for discipline-specific curricula, the European core curriculum in cariology,<sup>35</sup> the European Federation of Periodontology curriculum guidelines<sup>36</sup> and ADEE's pre-clinical operative skills curriculum<sup>34</sup> were popular resources.

### 3.2 | Teaching methods and the integration of topics of interest

The most frequent methods of learning and teaching used within PDDPs are practical exercises (Very often;  $n = 51$ , 71.8%) and didactic delivery (Very often  $n = 42$ , 59.2%) (Figure 1). The least used methods are bricolage (Never;  $n = 20$ , 28.2%) and peer-review (Never;  $n = 12$ , 16.9%). Many schools report that critical thinking ( $n = 52$ , 73.2%), professionalism ( $n = 54$ , 76.1%), and evidence-based practice ( $n = 51$ , 71.8%) are longitudinally integrated into their curriculum, while social accountability ( $n = 17$ , 24%) and environmental sustainability ( $n = 23$ , 32.4%) are not integrated at all or are in the planning stage of integration (Figure 2).

### 3.3 | Student opportunities

In terms of student opportunities within and beyond the core curriculum, many schools have a research component (mandatory;  $n = 25$ , voluntary  $n = 44$ ), opportunities to study abroad for more than 2 months (within EU;  $n = 57$ , outside of EU;  $n = 23$ ) and opportunities to volunteer and participate in Interprofessional Education (IPE) (Table 2). Sixty-six per cent of schools provide opportunities for IPE, with 45.1% providing specific IPE learning objectives/outcomes and the majority (53.5%) of schools offering opportunities for IPE with *other* health professionals (not OHPs).

### 3.4 | Clinical activities, staff–student ratios and the frequency of clinical sessions

Clinical observation commonly begins in one of the first 3 years of the PDDP, with the delivery of increasingly complex patient care occurring as students' progress through programmes (Figure 3). However, there are six institutions that commence observation of patient care in Year 4 or 5, with 47.9% of schools permitting students to deliver operative care from Year 4 onwards. Additionally, as students' progress, they commonly have increasing numbers of clinical sessions to

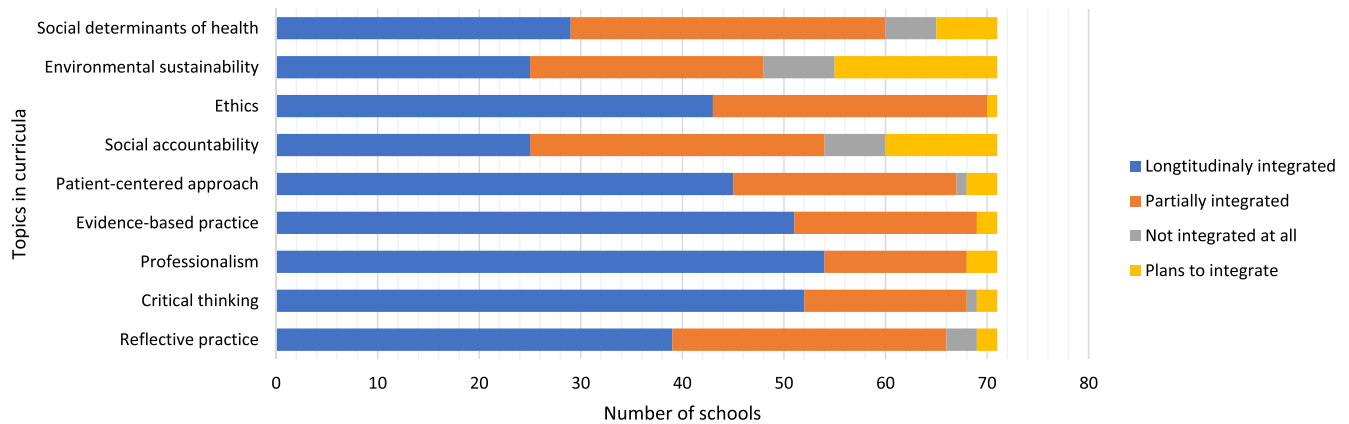


FIGURE 2 Integration of topics of interest within the Primary Dental Degree Programme curricula (n = 71).

TABLE 2 Student opportunities as part of their studies in a Primary Dental Degree Programme (n = 71).

	Count (n)	Per cent (%)
<b>Student opportunities for research as part of studies</b>		
No	2	2.8
Yes, mandatory	25	35.2
Yes, voluntary	44	62.0
<b>Student opportunities for studying abroad (&gt;2 months)</b>		
No	14	19.7
Yes, within Europe	57	80.3
Yes, outside of Europe	23	32.4
<i>Scope of study in another country</i>		
Research	12	16.9
Erasmus (clinical) or equivalent	53	74.6
Erasmus (Pre-clinical) or equivalent	34	47.9
Other	4.0	5.6
<b>Student opportunities to volunteer during their studies</b>		
Yes, organised by the institution	38	53.5
Yes, not organised by the institution	41	57.7
No	8	11.3
<b>Student opportunities to participate in interprofessional education (IPE) as part of their studies</b>		
Yes, with specific educational objectives for IPE	32	45.1
Yes, but without specific IPE objectives	15	21.1
No	24	33.8
<i>Which other professionals do students study and learn with on a regular basis?</i>		
Other OHPs	25	35.2
Other health professions	38	53.5
Professions outside health sector	5	7.0
Other	2	2.8

attend, with similar patterns for 5-year PPDs (Figure 4A) and 6-year programmes (Figure 4B). Part 1 of this series provides programme level data on all respondents including programme length. One school offered a 4-year graduate entry programme and therefore is

not included in Figure 4A,B. The most common staff–student ratio on dental clinics is 1:2–7 (n = 43, 60.6%), followed by 1:8–12 (n = 22, 31.0%) (Table 3). The most common staff-to-student ratio in clinical skills teaching laboratories is 1:8–12 (n = 31, 43.7%).

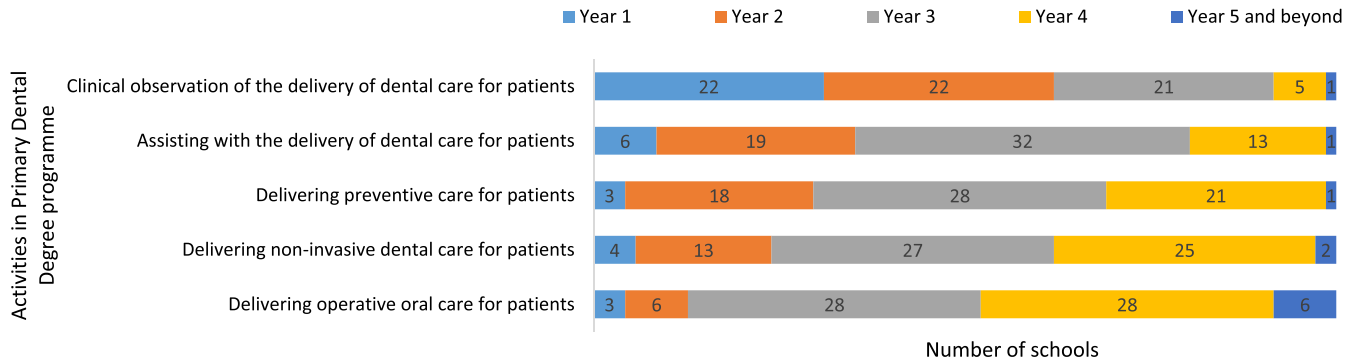


FIGURE 3 Commencement of clinical activities in the Primary Dental Degree Programmes by year (n = 71).

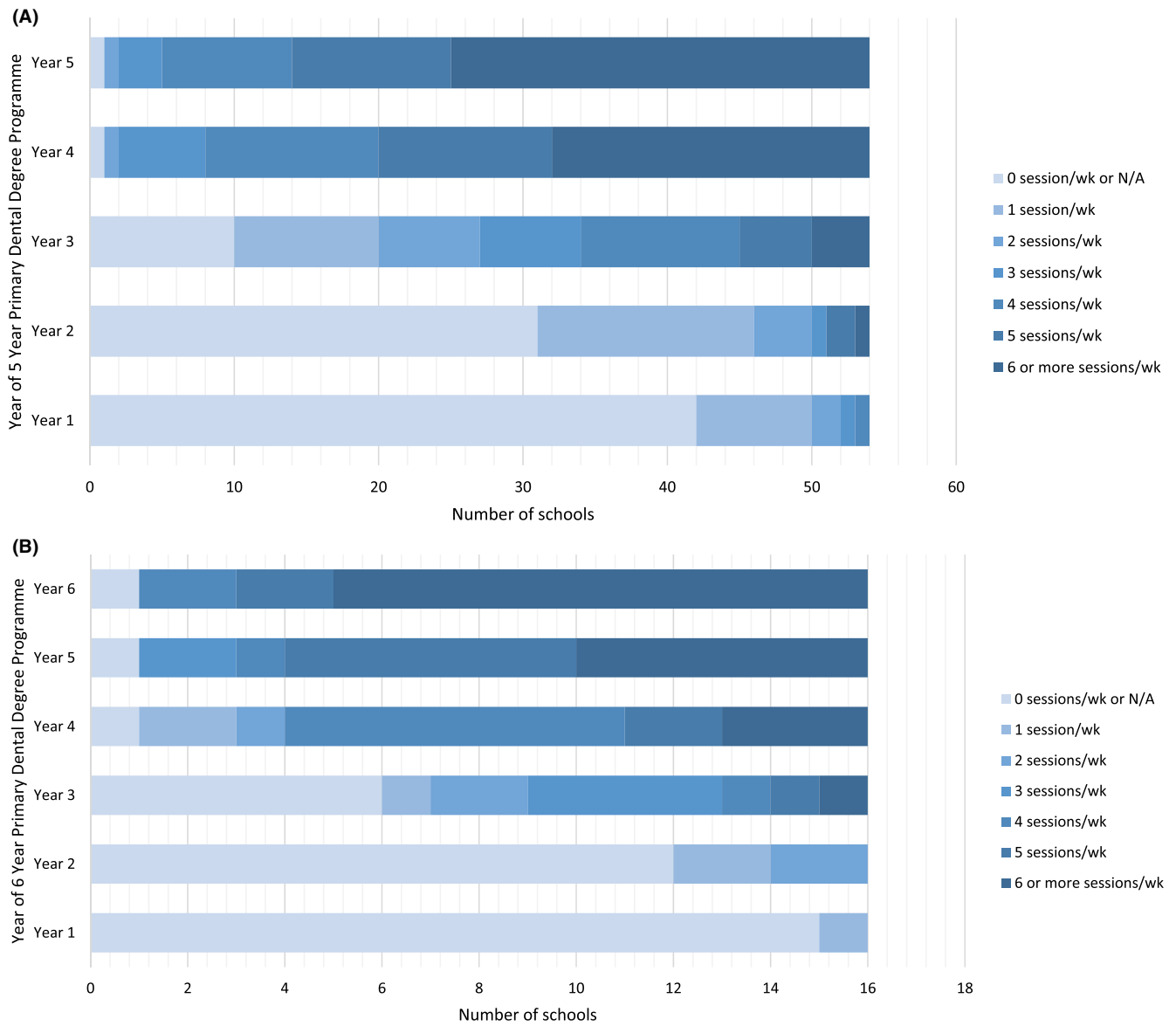


FIGURE 4 Average number of clinical sessions per week that students on (A) 5 year Primary Dental Degree Programme must attend (n = 54). (B) 6 year Primary Dental Degree Programme must attend (n = 16).

TABLE 3 Typical staff–student ratios in clinical and clinical skills teaching laboratory spaces for Primary Dental Degree Programmes.

Staff–student ratio	Count (n)	Per cent (%)	Staff–student ratio	Count (n)	Per cent (%)
<b>Clinics</b>			<b>Clinical Skills Laboratories</b>		
1:1	1	1.4	1:1–7	12	16.9
1:2–7	43	60.6			
1:8–12	22	31.0	1:8–12	31	43.7
1:13–20	5	7.0	1:13–20	21	29.6
1:20+	0	0.0	1:21–35	7	9.9
			1:35+	0	0.0
Total	71	100.0	Total	71	100.0

TABLE 4 Primary location of learning and teaching facilities and services (n = 71).

	In the dental school		Outside the dental school		Not available	
	Count (n)	Per cent (%)	Count (n)	Per cent (%)	Count (n)	Per cent (%)
Dental clinic	64	90.1	7	9.9	0	0.0
Physical library	41	57.7	30	42.3	0	0.0
Research laboratory	56	78.9	13	18.3	2	2.8
Dental VR simulator	33	46.5	2	2.8	36	50.7
Clinical skills teaching laboratory	67	94.4	4	5.6	0	0.0
Technical skills teaching laboratory	68	95.8	3	4.2	0	0.0
Support and well-being services	30	42.3	38	53.5	3	4.2

### 3.5 | Access to outreach practice and anatomical dissection

Forty-nine of 71 (69.0%) schools offer primary programme dental students the opportunity for outreach practice; while 21 of the 25 schools (84.0%) with dental hygiene programmes do too. Fifty-seven schools (80.3%) provide students with access to dissection on their PDDPs. Most have access to physical dissection ( $n=26$ , 45.6%), with 11 schools (19.3%) using virtual dissection and 20 schools (35.1%) employing both techniques.

### 3.6 | Access and location of facilities and technology

Dental students across Europe are able to access a range of different facilities (Table 4). Most commonly, teaching laboratories (for technical skills;  $n=68$ , 95.8%; for clinical skills;  $n=67$ , 94.4%) are located within OHP schools. Support and well-being services ( $n=38$ , 53.5%) and physical libraries ( $n=30$ , 42.3%) are often located outside of the school. Furthermore, almost half of the schools have access to dental VR simulators either inside ( $n=33$ , 46.5%) or outside ( $n=2$ , 2.8%) the dental school.

Dental students also have access to a number of teaching technologies (Table 5). The most common are digital radiography ( $n=65$ , 91.5%), electronic health records ( $n=56$ , 78.9%), and e-books ( $n=54$ , 76.1%). Some technologies such school-owned portable

electronic devices ( $n=32$ , 45.1%) and 3D printing ( $n=11$ , 15.5%) are less readily available.

### 3.7 | Teaching staff (faculty)

Returning to the topic of teaching staff, the number of junior and senior part-time and full-time staff is highly variable amongst the schools that provided data (Table 6). On average, junior part-time staff (42.05%) and senior full-time staff (28.06%) form a largest part of the teaching workforce. The mean percentages of junior full-time (15.07%) and senior part-time staff (14.81%) are smaller and similar to each other. Fifty-five schools report that their percentage of female teaching staff ranged between 41 and 70% (Figure 5). Two schools report having 0–10% female teaching staff, while three schools have at least 81%. The qualifications that newly recruited senior teaching staff are required to hold is most often a research qualification such as a PhD or Masters ( $n=59$ , 83.1%) (Figure 6).

### 3.8 | Quality assurance processes

The vast majority of schools ( $n=63$ , 88.7%) have a regular process of internal quality assurance that are either school or university-driven. Six schools (8.5%) do not employ internal quality assurance processes and respondents from two schools (2.8%) did not know if these processes were used. Student feedback, course evaluation

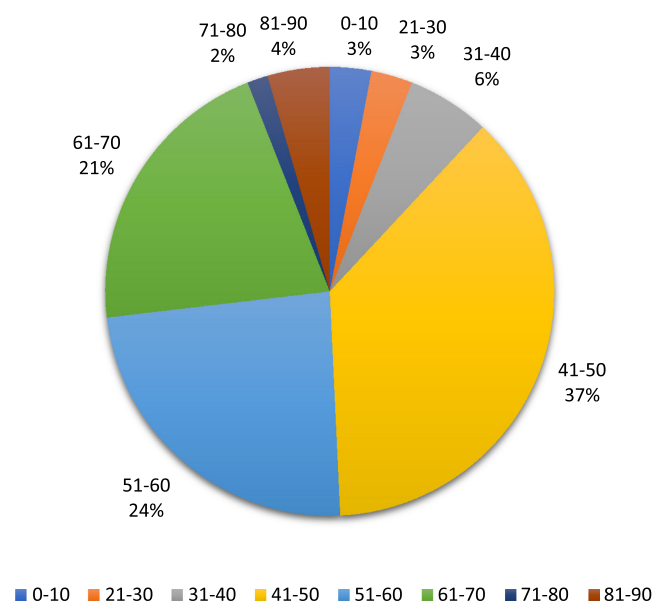


TABLE 5 Extent to which teaching technologies are available for use by students ( $n=71$ ).

	Regularly used		Infrequently used		Not available	
	Count (n)	Per cent (%)	Count (n)	Per cent (%)	Count (n)	Per cent (%)
Lecture capture	52	73.2	16	22.5	3	4.2
Digital radiography	65	91.5	5	7.0	1	1.4
Electronic health records	56	78.9	13	18.3	2	2.8
Intra-oral scanning	36	50.7	29	40.8	6	8.5
3D printing	24	33.8	36	50.7	11	15.5
E-books	54	76.1	13	18.3	4	5.6
School-owned portable electronic devices for students	18	25.4	21	29.6	32	45.1
Operating microscopes	29.0	40.8	33	46.5	9	12.7

TABLE 6 Average composition of teaching staff working within OHP schools.

Type of teaching staff	Percentage of staff type where count for each type >0		
	Mean	SD	Median
Junior full-time	15.07	13.25	10.61
Junior part-time	42.05	18.45	38.22
Senior full-time	28.06	14.02	27.59
Senior part-time	14.81	12.12	12.50

FIGURE 5 Estimated percentage of female teaching staff in OHP schools ( $n=71$ ).

and programme review were the most commonly reported processes. Similarly, many schools also have a regular process of external quality assurance ( $n=62$ , 87.3%), whilst seven schools (9.9%) don't and respondents from two schools (2.8%) were unsure. Most of these schools ( $n=41$ , 57.7%) make the results of external quality processes available online.

## 4 | DISCUSSION

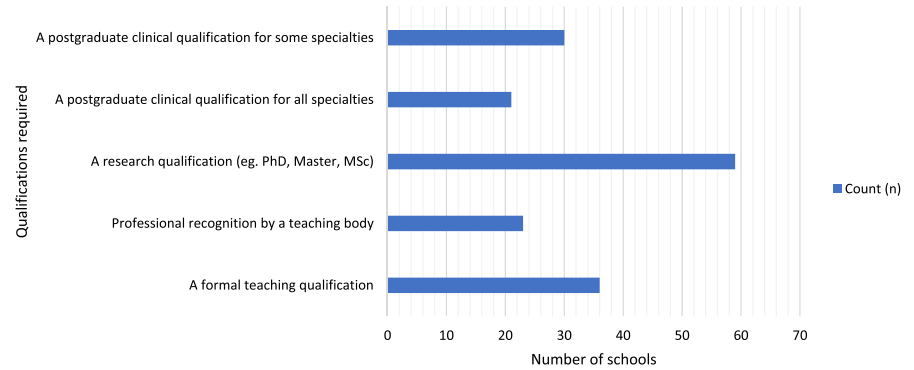
### 4.1 | Curriculum approaches

The majority of schools report that they have hybrid curricula meaning they use a mix of integrated and discipline-based approaches. This likely aligns to a general trend in OHP education, with increasing support for integrated curricula, which stems back to the 1980s and Harden's recommendations in medical education.<sup>41</sup> Integration may be horizontal (across different themes within the same year of study) or vertical (across different themes and years of study) and a combination of these is termed the spiral curriculum.<sup>42</sup> The reported benefits of integrated curricula include: a reduction in fragmentation of programmes, revisiting topics at increased complexity to embed desired knowledge/skills/attitudes at a higher level, fostering a true interdisciplinary approach to learning and teaching and facilitating curriculum monitoring and evaluation.<sup>41,43</sup> It is noteworthy that only around 20% of schools report using a fully integrated approach – it is plausible that institutions are still transitioning towards a fully integrated approach or may have found a fully integrated approach challenging to implement or perceive it to be undesirable. It would be of interest to carry out further research to understand the mindsets of these institutions as there may be potential barriers or problems with a fully integrated approach that are not readily identifiable in the literature. It is also not clear how fully integrated curricula are delivered in multiple different geopolitical contexts.

### 4.2 | Curriculum frameworks

More than 90% of schools use national frameworks to guide their PDDP curricula. This figure is largely expected as many European competent authorities and regulators provide curriculum frameworks that schools must adhere to. Schools from Spain, Malta, Cyprus, Denmark and Israel did not report the use of a national framework to inform their curricula. In these contexts, it is not clear what external quality assurance measures are in place, although the absence of a national framework does not necessarily mean that

**FIGURE 6** Qualifications required when recruiting senior teaching staff (faculty) ( $n = 71$ ).



these processes are inadequate. Most schools report to developing their own curricula locally and may use aids such as international/national/regional frameworks to support this. It is positive that 42 schools report the use of the GED framework as a guide for curriculum development. It is also of interest that over 15% of schools reported using curricula that have been developed elsewhere – this sharing of practice is positive and collaboration across multiple spheres in education may increase efficiency and quality. The free-text responses demonstrated substantial uptake of recent discipline-specific curriculum documents which further supports the calls for the development of other discipline-specific curriculum documents by the GED and O-Health-Edu vision for OHP education.<sup>4,25</sup>

### 4.3 | Methods of learning and teaching

From the data reported, it appears that there are a wide variety of learning and teaching methods are employed in PDDPs. As expected, didactic and practical exercises are used very often in most institutions. Didactic delivery is defined as 'the direct delivery of teaching material from teacher to student, typically in lecture format with little student engagement'.<sup>3</sup> The use of didactic delivery is an efficient means to deliver information to a large audience – making it a very useful methodology for dental schools. With technological advances, didactic delivery can become interactive and facilitate discussion between educators and students. From the list of learning and teaching methods included in this question (Figure 1), some present formal methods that are easily identifiable by the respondents. As respondents to the questionnaire were one single senior academic member of staff, it is feasible that some of the informal teaching methods (e.g. bricolage, peer-review, self-assessment) may be used more frequently but were not captured in the data. Unfortunately this is an unavoidable consequence of the research methodology employed, by selecting the Dean/Head of School (or a designated individual as recommended by the Dean/Head of School) – the research team feel the data is captured from the source best placed to answer the questions as accurately as possible. It is surprising that some schools do not utilise didactic delivery or practical exercises – due to the practical nature of the profession, it would be of interest to establish what methods are used to replace this learning.

### 4.4 | Integration of topics of interest

It is recommended that some topics should be longitudinally embedded across the length of the curriculum. These topics are often complex and some fit the definition of a threshold concept.<sup>44</sup> Some topics included in Figure 2 are well established in OHP education and others are more emergent areas of interest. There are published recommendations to support OHP schools in embedding some of these concepts in the curriculum, although they are limited to certain topics.<sup>30,32</sup> These documents largely include learning outcomes and recommendations for learning, teaching and assessment. It is noted that there is an absence of guidance for some topics and existing guidance documents do not always offer explicit examples of practice – this is an area of development for the future. The importance of these topics was also included in the O-Health-Edu vision for OHP education in Europe.<sup>4</sup> It is positive that the vast majority of respondents currently teach or are planning to integrate all of these topics in their curricula. It was expected that most schools longitudinally embed professionalism, critical thinking and evidence-based practice due to the perceived importance of these topics among European competent authorities, regulators and educational bodies.<sup>15,30</sup>

Environmental sustainability and social accountability are less frequently embedded within the curriculum and this is likely due to their more recent emergence as a topic of interest in OHP education. Although it is positive to note that more than 20 schools report to already teaching environmental sustainability longitudinally across their PDDPs. It would be interesting to uncover how these schools have longitudinally embedded this topic or in what guise this topic is perceived to be longitudinally embedded. It is important to note again that these are reported results of what educators feel is being delivered – it is not necessarily what schools are doing.

### 4.5 | Student opportunities for research

Most OHPs schools report that students have opportunities for research within their PDDPs. This does not align to a recent survey of European OHP students, which demonstrated that students largely disagreed that their OHP programmes provide clear guidance on extra-curricular research activities.<sup>45</sup> While this source refers

specifically to extra-curricular activities – there may be disparity in perceptions of opportunities between staff and students. It is impossible to establish the extent to which research is taught in OHP schools from this question alone. There is significant support from students to incorporate research in the curriculum and the student body has supported an open curriculum for research in OHP education.<sup>45</sup> Plans for an additional research domain for the GED are underway.

#### 4.6 | Student opportunities for travel and volunteering

The authors feel it is positive that over 80% of schools reported to providing opportunities for study in another country. Within the European Union, the Erasmus scheme for staff and student exchange is well established and provides a funding stream for studying or working in different countries. It is not clear whether these opportunities allow the students to provide patient care, in the authors experience this varies across Europe.

#### 4.7 | Student opportunities for interprofessional education

The value of IPE is well established in the dental education literature.<sup>4,46-48</sup> IPE may include collaborative learning within the OHP team, wider healthcare team or can extend to trans-professional learning with other professions (e.g. engineering).<sup>49</sup> It is positive that almost 2/3 of schools reported to providing IPE opportunities for their students and over half of these were opportunities with other health professionals. The scope, duration and frequency of these events are not clear. Additionally it is not clear if any of these responses refer solely to combined lectures with other health professionals – this do not really equate IPE with defined learning outcomes and opportunities for collaborative learning across professional programmes.

#### 4.8 | Commencement of clinical activities and average number of clinical sessions

The results from this dataset suggest there is significant variance in the commencement of clinical activities on PDDPs. Apart from observing the delivery of oral healthcare, all other clinical activities – including assisting, delivering preventive, non-invasive and invasive care – largely commence from Year 3 onwards. This likely is a legacy from traditional discipline-based curricula where the first 2 years of PDDPs were dedicated to the basic sciences. Additionally, some schools report that their students commence operative care in Year 5 onwards, although some 6-year PDDPs are included in these data (Figure 3). It is clear that schools vary in their delivery of clinical education, with some schools providing

early clinical contact from Year 1 or 2 of PDDPs and incrementally building on this, while other schools may deliver intensive clinical training later in PDDPs. While there is no published research comparing the two approaches, there are suggestions within the literature of a preference to initiate clinical contact early in programmes to develop professional skills and to provide students with experience of their chosen career path.<sup>50-52</sup> There are potential barriers to early clinical exposure that may limit implementation of this approach – this may include a lack of resources (clinical space, patients, increasing student numbers) or challenges with location; with some institutions delivering the early years of PDDPs at different sites.

#### 4.9 | Staff–student ratios in clinical spaces

There are similarities in staff–student ratios in clinical and clinical skills teaching laboratory environments within this dataset. Over 60% of schools reported 1 member of staff to 2–7 students in clinics, with this still being the most common group for clinical skills teaching spaces. However, there are increased frequency of lower staff–student ratios in clinical skills learning environments compared to those for clinical teaching. Higher staff–student ratios will reduce workload in these environments but requires increased resources. This data supplements a previous survey on pre-clinical operative dental skills by Field et al.<sup>33</sup> It is largely accepted that lower staff–student ratios are preferable to support student learning, as access to constructive feedback at regular intervals helps students to learn in these practical environments.<sup>53</sup> However, it is necessary to state that staff–student ratios will be contextual and depend on the clinic, discipline and space available – respondents may have selected the average staff–student ratio for their programme.

#### 4.10 | Access to outreach practice and anatomical dissection

Outreach practice is defined in Articulate as ‘dental clinics that allow undergraduate students to provide oral health care to a population geographically distant from the University’s main dental school or hospital. On occasion, outreach practices may focus on serving the needs of specific groups of patients’.<sup>3</sup> Access is reportedly high across OHP schools in Europe with almost 70% of schools providing outreach practice opportunities. The benefits of outreach practice are widely reported, with a shift away from hospital-based settings providing students with experience in authentic working environments in a primary oral health service.<sup>54</sup> Outreach practice in community settings has also been reported to improve self-confidence, clinical experience and operator speed.<sup>55,56</sup>

Many schools offer anatomical dissection utilising either physical or virtual methods. There is limited reporting of dissection practices and attitudes in OHP education, although two studies

have demonstrated some support for dissection within individual institutions.<sup>57,58</sup>

#### 4.11 | Access and location of facilities and technology

All respondents provide access to dental clinics, physical libraries, clinical skills teaching laboratories and technical skills teaching laboratories. While support and well-being services are widely available – more than half of these are situated outside the dental school. This may be a concern in contexts where the dental school is located at a significant distance away from the wider university's services, which may make access challenging for OHP students and staff. As OHP programmes are intensive and often stressful – it is necessary to provide easy-to-access support and well-being services to all members of the school.

It is of surprise to the authors that almost 50% of OHP schools reported access to dental VR simulators. This is substantially higher than a previous survey where it was reported that 25% of European schools have VR dental simulators, although the sample size was significantly smaller.<sup>59</sup> While this data states a high number of schools have access to VR simulators, it is not clear if they are used routinely to support learning and skill development in their PDDPs. VR simulation is an emerging topic in OHP education and further development is required to refine its use.<sup>60</sup> There is promising research demonstrating the potential for VR to provide authentic assessment and feedback in controlled situations<sup>61</sup> and in improving self-confidence in complex operative tasks prior to delivering patient care.<sup>62,63</sup> As all respondents to this survey are ADEE member schools and therefore may be more active in the OHP education community – it is possible that this data is an overrepresentation of the true uptake of VR simulators in Europe.

#### 4.12 | Teaching staff (faculty)

OHP schools appear heavily reliant on junior part-time staff and senior full-time staff with these two groups accounting for over 70% of the workforce. Junior part-time staff are often general dentists who work outside of the school for the remainder of the working week. It is concerning that such a high proportion of the workforce are held up by these two groups – with small numbers of full-time junior staff. This is potentially unsustainable or high-risk and may be indicative that institutions are struggling to succession plan effectively. Academic training pathways, that incorporate further teaching, research and clinical training are necessary to develop future academics and sustain the workforce. Funding may be an issue that limits the availability of these posts.

The estimated percentage of female teaching staff within this dataset varied from one school to another with a trend for a higher proportion of female staff in many places. This is not surprising as the World Dental Federation (FDI) states that women make up

between 48 and 75% of the dentist workforce in Europe.<sup>64</sup> While there is limited previous data for female numbers in academia, it appears that gender inequality correlates with higher ranking academic and leadership positions in many high-income countries.<sup>65</sup> This appears to be a common and unresolved problem across all health professions.<sup>66,67</sup> Women may form a significant majority of junior staff but when it comes to progress into senior positions the number seem to be lower. This may be related to an age cohort effect but also may be due to increased time constraints in order to comply with academic requirements or to find their place within the institutional political context.

From the data, there appears to be a significant focus on research qualifications when appointing senior teaching staff. Interestingly a postgraduate clinical qualification or teaching qualification are not required in over half of schools. The requirements and terminology around senior teaching staff are likely to vary across Europe, traditionally a research doctorate (PhD) is needed to be appointed as a lecturer but is not needed for senior clinical teachers – where the core focus is teaching and clinical care.

#### 4.13 | Quality assurance processes

Most schools reportedly undertake regular internal and external QA, with external referring to processes outside of the institution and internal referring to those within the institution.<sup>3</sup> The importance of regular QA has been noted in multiple recommendations at a European level.<sup>4,22,25,68</sup> Most free-text responses for internal QA referred to course evaluation, student feedback and programme review. These responses are commonly accepted internal QA processes, and in this sense, it is reassuring that institutional governance is, in most cases, driving the internal quality of programmes.

### 5 | LIMITATIONS OF THE RESEARCH

The limitations of the methodology employed has been discussed at length in [Part 1](#) of this paper series.

### 6 | RECOMMENDATIONS

The following recommendations have been developed by the authors in light of the findings across both papers within this series:

- Ascertain how individual countries regulate and define specialist dentists through research and collaboration with stakeholders.
- Institutions should consider succession planning and dedicate resources to developing junior academic members of staff.
- Review the suitability of clinical training across OHP schools in Europe through research and collaboration with stakeholders.
- Develop a curriculum development framework to aid schools in embedding new concepts longitudinally within programmes.

## 7 | CONCLUSION

As far as the authors are aware, this series of papers are the first attempts to provide a comprehensive overview of OHP education in Europe. In this paper, significant variability in the delivery of clinical education across the European OHP schools included in this dataset has been demonstrated. Promisingly, the dataset showed that the majority of European dental programmes are engaged in providing innovative and scientifically grounded education in order to develop quality future OHPs. Additionally, the dataset elucidates the value of the Graduating European Dentist in curriculum development and demonstrates substantial adoption of outreach and interprofessional education practices. Some concern has been raised regarding the sustainability of the current academic workforce in Europe.

A comprehensive view of the state of OHP education in Europe is not yet available but the O-Health-Edu datahub provides a means for all education providers in Europe to contribute data to reach this goal. In the future, as the O-Health-Edu project concludes, ADEE will oversee the functionality and branding of the datahub. It is anticipated that the datahub will be updated and built upon over time to continually establish a clearer picture of the state of OHP education in Europe. This is call for collaboration across all institutions and education stakeholders to develop OHP education for the future.

### CONFLICT OF INTEREST STATEMENT

No conflict of interest has been declared by the authors.

### DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

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## SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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