

COMMENTARY **OPEN ACCESS**

Graduating European Dentist Curriculum Domain V: Research

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ABSTRACT

This commentary introduces the new Graduating European Dentist Curriculum Domain V—‘Research’, and outlines the international multi-stakeholder development and consultation process that was undertaken in order to develop the new Domain.

1 | Introduction

It is widely recognised [1, 2], that working to an evidence-base, and being critically aware of the science that underpins clinical practice, is essential for delivering safe and effective patient-centred care. In order to achieve these outcomes, students must also understand the basis for, and the mechanisms that underpin dental research design, data analysis, and the communication of research data. Whilst direct reference is made about Evidence-Based Practice/Dentistry (EBP/EBD) in the current Graduating European Dentist (GED) curricula, the GED taskforce and its associated stakeholders concluded that the concept of Research within the undergraduate curriculum should be made more explicit. A recent pan-European survey demonstrated, reassuringly, that over 97% of responding Oral Health Professional (OHP) schools provide opportunities for developing research skills as part of their undergraduate programmes [3]. But, it is apparent that the research component of undergraduate OHP curricula is somewhat disparate across Europe—both in terms of taught content and methods/opportunities used to support the development of research skills.

2 | Development Process

Association for Dental Education in Europe began the development process by working with the European Dental Students Association (EDSA) to scope out opinions from undergraduate students across Europe, regarding the inclusion of research within their local curricula [4]. A 21-question online survey was administered to dental, dental hygiene, and dental hygiene and therapy students across Europe, and a total of 825 students from 33 European countries responded. The results demonstrated clearly that OHP students recognise the importance of research in the curriculum. The results also indicated that they are interested in learning more about research. The students reported relatively neutral opinions about their existing curricula providing enough training in research. The paper concluded that ‘European OHP students agree on the need for an open and explicit research curriculum in OHP education’. It was also stated that

■ The development of a research domain within an open curriculum framework would help to harmonise

[Correction added on 10 October 2024 after first online publication: Third affiliation was updated in this version.]

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the teaching and assessment of OHP research skills across Europe and ultimately improve graduating OHP's research skills.

Informed by the students' views, ADEE then arranged several workshops with the International Association for Dental Research (IADR). The initial workshop was held during the General Session in China, in 2022. The delegates included the CEO of IADR, the then-current President, the President-elect, and a past President. This expert group considered four main questions set against their own expertise, and relevant subject-specific literature:

1. What falls under the remit of 'research' in an undergraduate OHP curriculum?
2. How could skills and learning outcomes (LOs) be categorised?
3. Could existing GED LOs be moved from current domains to a new domain?
4. How does the student view compare to the educator view?

The outcomes from the IADR session were then considered at an ADEE GED Special Interest Group as part of the ADEE Annual Conference in Palma, Mallorca in August 2022. The findings were summarised and then three groups were asked to try to rationalise learning outcomes under three areas of major competence. A final group was asked to consider whether any existing GED learning outcomes from Domains 1–4 could be brought across into a new Research domain.

The GED Taskforce met in Malmo, Sweden, in April 2023, to distil the findings so far, and to author new LOs under each area of major competence. These were then considered by workshop delegates at the IADR General Session in Bogota, Colombia, in June 2023. The areas of major competence comprised:

- Research design.
- Data analysis and interpretation.
- Communicating and presenting data.

The taskforce employed a new method of *curriculum element analysis* in order to help categorise content and to provide support and guidance to educators. Workshop delegates were asked to rate their perceived *interest* and level of *importance* for each of the areas of major competence. The findings were then discussed, including the wording of the areas of major competence. Delegates were then asked, for each of the LOs, to rate their perceived *clarity of wording* and *importance within the curriculum*. These results were discussed before finally, delegates were asked if there were any elements that they felt were missing from the proposed LOs.

Finally, the LOs were considered at an ADEE GED Special Interest Group as part of the ADEE Annual Conference in Liverpool, UK, in August 2023. Once again, views were sought on perceived clarity and importance. The group also discussed pertinent emergent issues such as whether students should carry out some form of research 'project'—and perceived facilitators and barriers to this.

A timeline for the development process is shown in Table 1.

3 | Open Consultation

At the GED taskforce meeting in Edinburgh (December 2023) an open consultation was initiated through the ADEE GED web pages. The consultation provided a narrative document to rationalise the process and the approach—and once again invited respondents to rate the clarity and importance of each LO. The survey expanded on the *curriculum element analysis* approach and also asked about the perceived *difficulty of teaching* each LO.

The survey was advertised through the ADEE newsletter for several months, on the ADEE online platform, and through targeted direct communications to stakeholders. IADR also facilitated an extraordinary session at the IADR General Session in New Orleans (March 2024) to further promote the consultation and to gather stakeholder feedback.

The survey closed in June 2024 and received a total of 79 responses (43 free-text responses). Table 2 outlines the type of responses received.

TABLE 1 | Timeline of events.

2022	Project initiation and EDSA pan-European survey
2022	IADR China GED session (online, remote)—initial scoping
2022	ADEE Palma GED session—rationalising areas of major competence, and considering content of existing GED domains
2023	Survey publication
2023	GED Taskforce meeting, Malmo, Sweden—generate LOs under each area of major competence
2023	IADR Bogota GED session—feedback on LOs
2023	ADEE Liverpool GED session—further feedback on LOs
2023	GED Taskforce meeting, Edinburgh—develop Domain narrative and consultation framework
2024	IADR New Orleans GED session—further discussion and dissemination of the survey
2024	Survey closure and analysis

TABLE 2 | Types of responses received.

40	Individual
30	Institution
4	Society/Association
4	Student
1	Regulator

Following the closure of the survey, the GED taskforce met one last time to consider the comments and make any necessary changes. All but one free text response was supportive in nature, and several reviewers commented positively on the approach that ADEE has taken to seeking opinions on each LO:

This exercise is very interesting because although some learning outcomes appear closely linked with others, it is not necessarily the case that they should be developed to the same level.

I would welcome these learning outcomes, and thank you very much for developing them. The [national regulator] learning outcomes are sparse and vague in terms of evidence-based practice, which has led to a very wide variation in the amount taught across [country] Dental Schools.

ADEE's Graduating European Dentist aligns with the learning outcomes and behaviours in the [regulator's national framework]. While our regulatory framework includes high level learning outcomes, Domain V provides more detail, and these more detailed outcomes could work well as complementary material for education providers when designing and developing their curricula.

More than 15% of respondents rated 3 of the 15 LOs as unclear—and these were revisited in light of the free-text comments. More than 50% of the respondents rated 5 of the 15 LOs as important or aspirational, rather than essential. More than 50% of the respondents rated 4 of the 15 LOs as difficult to teach.

The next stage for the GED taskforce is to work with subject-matter experts to develop helpful teaching resources for the aspirational and difficult-to-teach material—and this advice will be published in due course. Learning outcomes related specifically as more aspirational or more difficult to teach, are outlined in Tables 3 and 4.

TABLE 3 | Elements labelled as more aspirational within the curriculum.

5.1.3	Formulate an effective and logical strategy for finding information
5.1.7	Explain the principle of a hierarchy of evidence
5.1.9	Describe the main ethical considerations when planning research

TABLE 4 | Elements labelled as more difficult to teach.

5.1.4	Explain the value of peer-review in quality assuring research
5.1.6	Propose an appropriate study design to answer a particular research question
5.2.2	Critically appraise published research
5.2.3	Formulate appropriate conclusions from, and understand the limitations of, research data

4 | Final Comments and Acknowledgements

The finalised Domain narrative and LOs are detailed below. This is also now available on the GED website, where any of the LOs can be browsed, retrieved, and commented on, using the embedded tools within the curriculum pages.

It is ADEE's intention that the Domain V Research LOs be mapped across existing curricula rather than schools creating a local stand-alone module for Research. This is in line with other implementation recommendations [5, 6] which also suggest that:

- LOs are integrated logically and reinforced longitudinally throughout the programme, taking account of importance and complexity.
- Educators should co-create resources with students, inviting student opinions about how they might wish to express their understanding, opinion and motivation for engaging with research in OHP programmes.

Association for Dental Education in Europe would like to thank all stakeholders that engaged with this process and in particular, EDSA for their insightful and helpful preparatory work with students across Europe—and IADR for their commitment to developing such necessary LOs.

5 | Domain V—Research

5.1 | Introduction

Recognising that dentists are expected to practice to a robust evidence base, it is important that they are able to:

- 5.1.1 Choose appropriate sources of evidence or information.
- 5.1.2 Draw accurate conclusions from information sources.
- 5.1.3 Communicate and attribute information appropriately.

The undergraduate curriculum should reflect the importance of these principles.

5.2 | Active Involvement in Research

Aspirationally, curricula might provide students with the opportunity to learn about, or engage with, the process of carrying out a research project. The workshops carried out by the ADEE curriculum taskforce show that educators strongly believe that students should carry out some form of 'research project', even

though perceived common barriers include a lack of experienced supervisors, a lack of space in the curriculum, and problems with financing projects. These barriers are echoed elsewhere [7]. In contrast, identified enablers include:

- Having enthusiastic and experienced staff.
- Allowing students to choose their own research topic.
- Having a clear and structured programme to guide students (and staff).
- Offering explicit learning outcomes.

The last point about offering explicit learning outcomes is also supported by Murray et al. [8] and Lee et al. [9] who noted in their systematic reviews of medical students' research skills and training, that there is often poor constructive alignment between intended learning outcomes, and assessment methods—especially in programmes offering solely 'project-based' methods of delivery.

It is well-understood that 'learning by doing' results in a more profound reflection, and retention of knowledge and skills—but this does not necessarily mean that students must complete an actual research project from start to finish. The behaviour-based learning outcomes stated below are written in such a way that educators can devise learning and assessment activities that fit either model of student engagement. At the very least we believe that students should be able to formulate effective and logical search strategies for finding information—and whilst searches that are logical are likely to be effective (and vice versa), we do recommend that students are able to explicitly do both.

Association for Dental Education in Europe workshops have also shown that the teaching methods educators would recommend for facilitating student research activity include collaborative projects, critical appraisal of papers or sources (such as involvement with a journal club) and gamification of research. Methods of suggested formative and summative assessment include oral presentations, communicating information to patients, and tutoring to more junior students.

5.3 | Choosing and Managing Sources of Information

In an era of information overload and social media, it is becoming increasingly evident that our students need help in developing skills for choosing information sources appropriately. It is also reported by many educators that information literacy skills appear to be waning, including skills for communicating and managing information—as well as attributing sources correctly. As artificial intelligence plays an increasing role in student learning, it is increasingly important that students are able to demonstrate academic integrity—and correctly acknowledge sources of ideas and information that they use within their work. These elements are explicitly included within this new curriculum domain.

6 | Major Competence: 5.1: Research Design

Learning outcomes:

A graduating dentist must be able to:

- 5.1.1 Formulate relevant research questions/hypotheses.
- 5.1.2 Identify appropriate databases/sources of information.
- 5.1.3 Formulate an effective and logical strategy for finding information.
- 5.1.4 Explain the value of peer-review in quality assuring research.
- 5.1.5 Appraise the various types of study design.
- 5.1.6 Propose an appropriate study design to answer a particular research question.
- 5.1.7 Explain the principle of a hierarchy of evidence.
- 5.1.8 Explain the need for ethical review prior to carrying out research.
- 5.1.9 Describe the main ethical considerations when planning research.

7 | Major Competence: 5.2: Data Analysis and Interpretation

Learning outcomes:

A graduating dentist must be able to:

- 5.2.1 Justify the need for critical appraisal of research.
- 5.2.2 Critically appraise published research.
- 5.2.3 Formulate appropriate conclusions from, and understand the limitations of, research data.
- 5.2.4 Explain how conclusions from research might impact on clinical practice or patient care.

8 | Major Competence: 5.3: Information Literacy

Learning Outcomes:

A graduating dentist must be able to:

- 5.3.1 Effectively summarise and present findings from original research or published papers.
- 5.3.2 Correctly acknowledge sources of information or ideas.

Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

Data sharing is not applicable to this article as no new data were created or analyzed in this study.

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