

Abstract

Introduction

Recent developments in European dental education are student-focused, concerned with competency-based and problem-based learning. The development of dental educators has so far received little consideration. This study aimed to agree curriculum content for developing dental educators so that they are better able to support changing undergraduate dental education.

Methods

Adopting consensus methodology, a two-round Delphi was conducted in 2012. Fifty-three dental educators and 39 dental students across Europe volunteered to take part. The Delphi questionnaire was developed based on literature, piloted, and sent to participants to gather opinions and seek consensus on educational content using rating-scales and open-ended questions. Numeric data were analysed using descriptive statistics and qualitative data were analysed thematically.

Results and Discussion

This study revealed seven domains of curriculum content for dental educators. Four of these domains were considered essential: educational principles; educational practice in dentistry; curriculum, quality, and improvement; and educational professionalism. Three domains were viewed as optional and could be tailored to local needs: educational principles in relation to specific contexts, educational research, and educational and healthcare management. When developing training for dental educators, factors which need consideration were identified as: the academic position and teaching experience of educators, and the nature of clinical dental education.

Conclusion

The results are beneficial for: individual educators to inform professional development plans; institutions to devise faculty developments; ADEE to inform policies on developing European dental educators; and other disciplines to inform training for their educators.

Introduction

The principal aim of dental education is to transform students into competent, caring dentists to serve societal needs and improve societal oral healthcare (1). The recent shift in pedagogic focus toward more student-centred education impacts the educator (2, 3). In this paper we use the term 'dental educators' to refer to educators of undergraduate (UG) dental students. The term includes any staff who have a role in supporting UG dental students whether employed full-time or part-time, dental and non-dental professionals, academic and non-academic, university-based or not. The dental educator role encompasses teaching, research, management, and healthcare (4). Areas of competence for dental educators have been identified (4, 5) including: educational theories, principles, and methods; assessment and feedback; curriculum and evaluation; management; healthcare system; and professionalism. Individual educators may not need to be competent in every area but should be competent in areas relating to their specific roles (6).

Faculty development is used to support educational competence training for educators (7). In-service short course seminars with post-workshop development have been found to be effective (8). However, such faculty development may not provide comprehensive educational competence, especially if there is limited training time (1). One possible solution is to develop a training programme or curriculum which provides a broad and comprehensive content for developing educational competences essential for being an effective European dental educator. However previous research has focused on educational change processes, rather than preparing educators to support change (9). The development of roles and competences of dental educators in Europe, as well as research and policy in this area, has been largely overlooked. This study seeks to address this gap. It aims to identify an agreed curriculum content for developing competences in educators of European UG dental students.

Methods

The Delphi Method

Delphi was employed as the main method of this study. Delphi is used to identify agreement, expand agreement, and adjust disagreement with particular issues by using a group of people who have relevant insight, knowledge, or experience (10). It is a process of obtaining expert opinion to develop consensus by using an iteration of questionnaires and feedback (11).

Preparing the Delphi

The Delphi questionnaire was developed based on the literature (4) and triangulated with information on health professional education programmes analysed from 11 institutions in the UK, Europe, and Australia. The questionnaire consisted of four sections: instructions, consent form, the main questions, and demographic data. The main questions were separated into two parts: a four-point Likert scale (1= not necessary, 2 = optional, 3 = desirable, and 4 = essential) asking the panellists to rate their opinion of 51 pre-defined curriculum content items, and open-ended questions allowing panellists to provide information to support their rating and suggestions for adding, deleting, or adjusting each item in the list. The questionnaire was validated by two educational experts. A pilot study was completed by volunteer dental educators and students at one UK university.

The expert panel of dental educators (n=53) was sourced from those attending the Association of Dental Education in Europe (ADEE) annual conference in 2010-2011. The dental student panel was sourced from those attending the European Dental Students Association (EDSA) in 2012-2013. Dental students (39 undergraduates) were included to broaden the spread of ideas (12). A panel size of 30 is acceptable in Delphi studies (13). The response rate of a Delphi study should not be lower than 70% in order to provide meaningful results (14).

An e-Delphi using the Bristol Online Surveys (BOS) was conducted for the educator panel while a paper-based Delphi was implemented for the student panel. In total, two Delphi rounds (R1 and R2) were conducted during 2012-2013.

Educator Panel

This panel was divided into four groups using the United Nations classification: Eastern, Northern, Southern, and Western Europe. Panellists were given four weeks to complete the questionnaire. A reminder email was sent to non-respondents at the beginning of weeks 3 and 4. The questionnaire was analysed and the R2 questionnaire with a feedback report was developed. All respondents were included in the R2 unless they indicated that they wished to withdraw from the study. In R2, only non-consensus items were presented. The R2 questionnaire was administered and analysed using a similar process to the R1. The final report was sent to all respondents by email to verify the study's results and allow respondents to give feedback on the result. The data collection process for the educator panel is summarised in Figure 1.

Insert Figure 1 here

Student Panel

The R1 questionnaire was distributed to and completed by student representatives at the EDSA meeting in Lyon, France, 2012 and the R2 questionnaire was completed by student representatives at the EDSA meeting in Belgrade, Serbia, 2013. Student panellists were categorised by country and geographical area and all verified questionnaires were administered and analysed using the same processes as in the educator panel. The data collection process for the student panel is shown in Figure 2.

Insert Figure 2 here

Some respondents in the Lyon (R1) did not attend the meeting in Belgrade (R2). Accordingly, to support data analysis, a supplementary questionnaire was developed and distributed to students who did not participate in the R1. They were asked if they agreed with the consensus and non-consensus items and provided with a comment box.

Data Analysis and Interpretation

Demographic information and data from the rating scales were analysed using SPSS-20. Both descriptive statistics (frequency, percentage, central tendency, and standard deviation) and inferential statistics (Wilcoxon Signed Ranks, Mann-Whitney U, and Kruskal-Wallis tests with confidence level = 95%) were generated. The consensus level was pre-set as shown in Table 1.

Insert Table 1 here

Qualitative analysis was used to explain the rationale behind the consensus and create the linkage between the results and the contexts (15). Data from open-ended questions were analysed thematically using NVivo-10.

Data Verification

One limitation of the Delphi method is that although the consensus is made by heterogeneous expert panellists, the experts' opinions may not reflect the general opinion of the whole population, limiting generalisability (16). To ameliorate this challenge, data verification sessions at the ADEE and EDSA meeting (Birmingham, UK, 2013) were conducted, using a questionnaire to obtain feedback from and gain approval from a wider group of dental educators and students. The main questions asked respondents if they agreed or disagreed with the content of the educator-curriculum which we derived from the Delphi. Respondents were invited to raise issues which might need consideration when applying the proposed educator-curriculum in their organisation or country.

Ethical Approval

This study received ethical approval from [the Dental School Research Ethics Committee, Cardiff University, UK \(DSREC Reference Number 11/34\)](#).

Results and Discussion

Demographics

From the original sample who completed R1, 39 educators (73.6% response rate) and 17 students (43.6% response rate) completed the R2. Demographic information of both panels is presented in Tables 2 and 3. There was no statistically significant difference between the composition of the panels between rounds.

Insert Table 2 here

Insert Table 3 here

Approximately 90% of educators in both rounds had more than five years teaching experience, allowing them to identify problems in the educator-curriculum, their educational needs and areas of further pedagogical development. Three-quarters of participants were full-time educators; the remainder were part-time educators who had teaching sessions for more than half-a-week. For part-time educators, the high average number of sessions per week suggested that they would have considerable experience of their UG curriculum. Three quarters of educators were involved in university-based education especially in classroom and clinic-based teaching. The results have relevance for university-based educators who provide teaching at the clinical level and may also be relevant to basic science educators and educators in a community or outreach environment.

The response rate of the student panel was low. Thus, a supplementary questionnaire was distributed to non-participants in Student R1. Its results were consistent with the student R2 results.

The Delphi Results

The questionnaire consisted of 51 educational content items categorised into 12 topics. In the educator panel, 38 items (75%) and in the student panel, 43 items (84%) achieved consensus for inclusion in the educator-curriculum (Table 4 and 5). In R2 of the educator panel, only one of the 14 non-consensus items from R1 achieved consensus. In the student R2, eight of 15 non-consensus items from the R1 achieved consensus.

Insert Table 4 here

Insert Table 5 here

The results were verified by European dental educators and students at the ADEE and EDSA meetings in August 2013. Most respondents' demographic information from the data verification process was analogous to information from the main study.

Proposals for an Educator-Curriculum

All 51 items were re-categorised based on the data verification and literature. The proposed educator-curriculum consists of seven domains. The term 'domain' in this study represents 'a broad category of educational competence for European dental educators'. Domains 1-4 contain all consensus items of the educator panel, the fundamental content of the educator-curriculum in which all educators might be expected to be competent. Domains 5-7 comprise non-consensus items from the educator panel, the optional content which might be tailored to local needs.

The Core Curriculum

Educational content included in the core curriculum along with (i) the results from educator and student panels and (ii) a summary of issues raised in the open comments are shown in Table 6.

Insert Table 6 here

These core items were seen as fundamental for educators pursuing teaching roles. The result is consistent with previous studies that also showed principles related to teaching, learning, curriculum, leadership as well as educational professionalism are perceived as important for being effective educators (4, 6, 17). Although four items in the student panel – ‘learning environment’, ‘assessment calibration’, ‘learner’s problems and difficulties’ and ‘one-to-one teaching’ – did not achieve consensus (i.e. below the pre-determined cut-off mean value of 3.2), the level of consensus of these two items was still high (>80%). Therefore, it was decided to treat these items as consensus items for inclusion.

Domain 1: Educational Principles

This domain covers the educational basis of learning and teaching in UG dental education. For each topic, we draw attention to and discuss any significant results and key issues relating to open comments.

‘Learning theories’ are fundamental for the teaching role. However, clinical educators still require further development in this area as it was noted that, for example, *“clinicians are not fully aware of these concepts [learning theories]”* (T1-E15/N-Europe). Greater understanding and critical awareness of learning theories need greater emphasis.

From the student perspective, educators have not utilised current technology to support learning – *“up-to-date teaching using new technology is seldom found”*

(T1/P6/W-Europe). Technology-enhanced learning could be a part of the educator-curriculum. However, using technology to enhance learning may require considerable investment in time and professional support when many dental schools are facing financial challenges (18).

Domain 2: Educational Practice in Dentistry

This domain represents practical aspects of teaching and learning in dentistry. Many educators in the study agreed that 'reflective practice' is an essential part of clinical teaching. While learning in dentistry involves tacit knowledge, reflective practice helps students to be aware of such knowledge (19). It allows students to link new experiences to prior knowledge to develop deep learning (20) and help students integrate foundation knowledge and skills into practice (21).

The consensus level for 'feedback' was significantly higher amongst students from Northern Europe than students from Southern Europe ($p < 0.01$). Feedback requires clear and structured communication between students and educators. Differing cultural backgrounds may be a factor here. Students from Southern Europe, whose cultural background tends to support a large power-distance and emphasises constraint, might be uncomfortable with open discussion with educators who are hierarchically their seniors (22, 23). Educators need to understand how to deliver constructive feedback that supports student learning, especially in a manner congruent with the student's cultural background.

Domain 3: Curriculum, Quality, and Improvement

It is important for educators to understand curriculum evaluation, which is required for curriculum development and implementation, however, leadership and teamwork involving managing change, solving institutional problems, and securing the future of profession (4, 24, 25), was still lacking – "... *lack of good leadership is currently one major issue in dentistry*" (T9/E01/N-Europe). This topic requires consideration as it is

“a necessary ability that all dental educators should have, regardless whether they occupy administrative and managerial positions or not” (T9/E22-2/S-Europe).

Domain 4 Educational Professionalism

This domain concerns the professionalism of educators. It was mentioned that educators need to be a good role model for students; for instance, *“all teachers should be professional role models and behave in a professional manner.”* (T12/E17/N-Europe). In clinical practice, students can learn from their educators unconsciously through observation and imitation of the educators’ behaviours (19); educators as good role models are essential for supporting student learning (26, 27).

Students expect educators to be both good practitioners and teachers (27, 28). It was mentioned that *“if teachers are not competent in professionalism, what hope is there for the students!”* (T12/E33/N-Europe). Professionalism can be seen from two aspects: educational professionalism (i.e. educators as good teachers) and dental professionalism (i.e. educators as good dental practitioners). The educator-curriculum needs to focus on both educational and dental professionalism.

Educators as content experts was highlighted in the study; for example, *“certain knowledge and skills are necessary [for teaching].”* (T12/E08/N-Europe). It is possible that content experts (who are also competent educators) will realise that students may need only a portion of their specialist knowledge; they know what that proportion should be and know how to support students to acquire that knowledge (29).

The Optional Curriculum

Educational content included in the optional curriculum along with (i) the results from educator and student panels and (ii) a summary of issues raised in the open comments are shown in Table 7.

Insert Table 7 here

All items in the optional curriculum failed to achieve consensus in the educator panel.

Domain 5: Educational Principles in a Specific Context

Both 'inter/multi-professional education' and 'outreach education' were confirmed in the study as important for helping students to learn and work in a realistic professional arena. However, both topics are susceptible to failure for various reasons. For instance, "*If students do not engage well, it will fail*" (T2/E18/N-Europe) or "*... sometimes the students learn too well how to cut corners*" (T2/E05/N-Europe). Practical problems for implementing these educational concepts include time constraints, high demands of resources and staffing, complex administration, assessment issues, inflexible curriculum, shifting from education to service, consistency of pedagogical approach, and educational monitoring (30-32). The educator-curriculum needs to focus on the benefits and challenges of these topics.

The item 'learners with special needs' did not achieve consensus in both panels. School leavers with certain physical disabilities will not enter dental school. However, some learning difficulties such as dyslexia may only be revealed during the programme. Although a university student support service may be able to provide advice and support, it is essential for educators to understand the implications of any disability for student learning.

In the student panel, only 21% felt that large group teaching is essential for the educator-curriculum. However, the study results showed that students from Northern Europe rated large group teaching as more important than students from Southern Europe ($p < 0.05$). Where large group teaching is still employed, the educator-curriculum needs to emphasise an awareness of cultural differences that can compromise or enhance the quality of large group teaching, and how to deliver

effective large group teaching. Lectures embedded with interactive components can stimulate student learning (33). In contrast, where large group teaching is not generally used, this topic may not need to be included in the educator-curriculum.

Domain 6: Educational Research

It is likely that dental educators conduct research which relates to their clinical work rather than to education. Although there is an increasing number of published papers in dental education journals (34), their growth is dwarfed by those of other dental subjects. Moreover, the impact factors of dental education journals are low. Thus, many educators think educational research is not important or beneficial to their academic careers. **Indeed one study (6) has suggested that educational research is not essential for teaching-led educators.**

Contrasting views about educational research were expressed: on the one hand, one observed that “... *we need more qualified researchers in dental education*” (T8/E13/W-Europe); on the other, “*not everyone in dental education needs to be a researcher in the field [of education]*” (T8/E11-2/N-Europe). The demographics of the educator panel may go some way towards explaining such contrasting views: a quarter were part-time staff and for nearly two-thirds, UG teaching occupied less than 40% of their duties (Table 2).

Whether actively engaged in educational research or not, educators need to be able to critically evaluate evidence and good practice in education to inform their teaching (5, 35-37).

Domain 7: Educational and Healthcare Management

Student recruitment relates to the quality of the graduates (38), and as participants observed; for example, “... *get recruitment wrong and [then] you may have a life-long problem dentist*” (T9/E03/N-Europe). The level of consensus on ‘student recruitment

and admission' was much lower in the educator panel than the student panel. Students clearly have a close personal interest and expect the recruitment and admission system to be fair and transparent and believe this is a direct responsibility of educators.

An understanding of the healthcare systems and regulation can inform the work of educators and help them to prepare students for their future working environment. Comments on this topic included: *"Some knowledge about how the regulatory system works could make it easier for teachers to adopt the QA-actions"* (T10/E02-2/W-Europe); and *"Dental Schools are preparing workers for the Healthcare Systems (either private or public) therefore teachers should prepare student for the future working environment"* (T11/E01-2/N-Europe).

Factors to Consider when Developing the Educator-Curriculum

Comments and opinions not related to the core and optional content from the main study and data verification were combined and thematically analysed. Two issues were highlighted as needing consideration when developing and implementing the educator-curriculum.

Firstly, it seems that most topics in the educator-curriculum are not so important for part-time educators who deliver teaching at the chairside. However, it was noted by some respondents that part-time educators have not yet been fully aware of educational principles. The educator-curriculum should provide fundamental knowledge and competence concerning the educational needs of part-time educators.

Secondly, clinical dentistry is different from other health professional education as it involves not only the student-educator relationship (i.e. teaching and learning) but

also irreversible procedures conducted in an intimate part of the body, with patients who may be anxious, and complex, technique-sensitive materials often requiring manipulation in areas of the mouth that are difficult to access, and conducted using a mirror image. A specific educator-curriculum which emphasises the dental context and the nature of dentistry is required.

Implications and Recommendations

The curriculum content identified in this study provides detailed information on those competencies deemed essential for developing individuals who are involved in the education of dental undergraduates. At the individual level, the content can help educators to identify areas for improvement which could be included in their personal development plan. At the institutional level, the curriculum content allows an institution to plan and tailor a faculty development (FD) programme to help their teaching staff improve educational competences. Additionally, the content also provides a framework for developing continuing professional (CPD) development for educators, both inside and outside the institution. It is becoming increasingly inappropriate that university staff are allowed to teach students without any prior pedagogical instruction or possessing a teaching qualification. In the UK, for example, one strategy is to require all newly appointed junior staff to undertake a formal postgraduate programme in education. Figure 3, using a temple as a structural analogue, demonstrates how the educator-curriculum proposed by this study can be used to develop a postgraduate programme.

Insert Figure 3 here

There are four core domains which the results of our study suggest are essential for teaching roles and in which all educators should be competent. 'Educational principles' and 'educational practice in dentistry' are the base of the 'temple' as they are the fundamentals of teaching and learning in dentistry. 'Curriculum, quality, and improvement', as the upper layer of the temple base, indicates other roles and responsibilities of educators that support teaching and learning. 'Educational

professionalism' is represented as the roof of the temple. It defines core values and characteristics of good, effective educators.

The optional domains which can be tailored to local needs are represented as three pillars of the temple which refer to the roles of educators within the UG dental education – teaching, research, administration, and providing healthcare – which educators need to build upon gradually during their educational career. 'Educational and healthcare management' covers both administrative and healthcare roles.

Thanks to the Bologna Process and the DentEd Thematic Network Project (39) UG dental curricula are moving toward harmonisation across Europe in order to create a comparable qualification. However, the process to develop and standardise the quality of educators has not yet been established. Dental professional bodies (such as ADEE) could be the main support in helping academic institutions implement the educator-curriculum. The model of educator-curriculum could be applied in other disciplines. However, discipline context is very important and needs to be understood so that the practicality of the content can be addressed and for the successful development of educators within the discipline.

Limitations

The total number of respondents in this study was relatively small for a pan-European study. They were selected from the ADEE and EDSA attendant list and the majority of respondents were from Northern and Western Europe. The limited number and uneven distribution of respondents cannot fully represent the whole of the greater European views on the curriculum content; however, attendance at these meetings demonstrates an interest and commitment to dental education.

The Delphi questionnaire was developed using the English language and thus biases English-speaking countries. Future research is needed to develop a strategy which can gather responses from representatives from all European countries.

Whilst this research revealed an agreed curriculum content and influencing factors, the results have not been fully explored due to the limited nature of the Delphi method. The underlying reasons why specific curriculum content is essential in dentistry are not explained, or how local factors (e.g. culture, politics) influence the educator-curriculum. Other methods (e.g. focus groups, detailed surveys with advanced statistical tools) could be used to explore the educator-curriculum at a broader and deeper level.

Conclusion

This study has identified a curriculum for educators of UG dental students in Europe. It reveals *what* educational competences educators need to develop, as well as *what* influences the educator-curriculum. While previous literature has outlined a long list of educational competences for (dental) educators, this study adds new knowledge to this area by identifying a 'practical' curriculum that indicates both essential and context-specific content relating to the European context.

Conflicts of Interest

The authors have no conflicts of interest to declare.

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Figure 1 The data collection process of the educator panel.

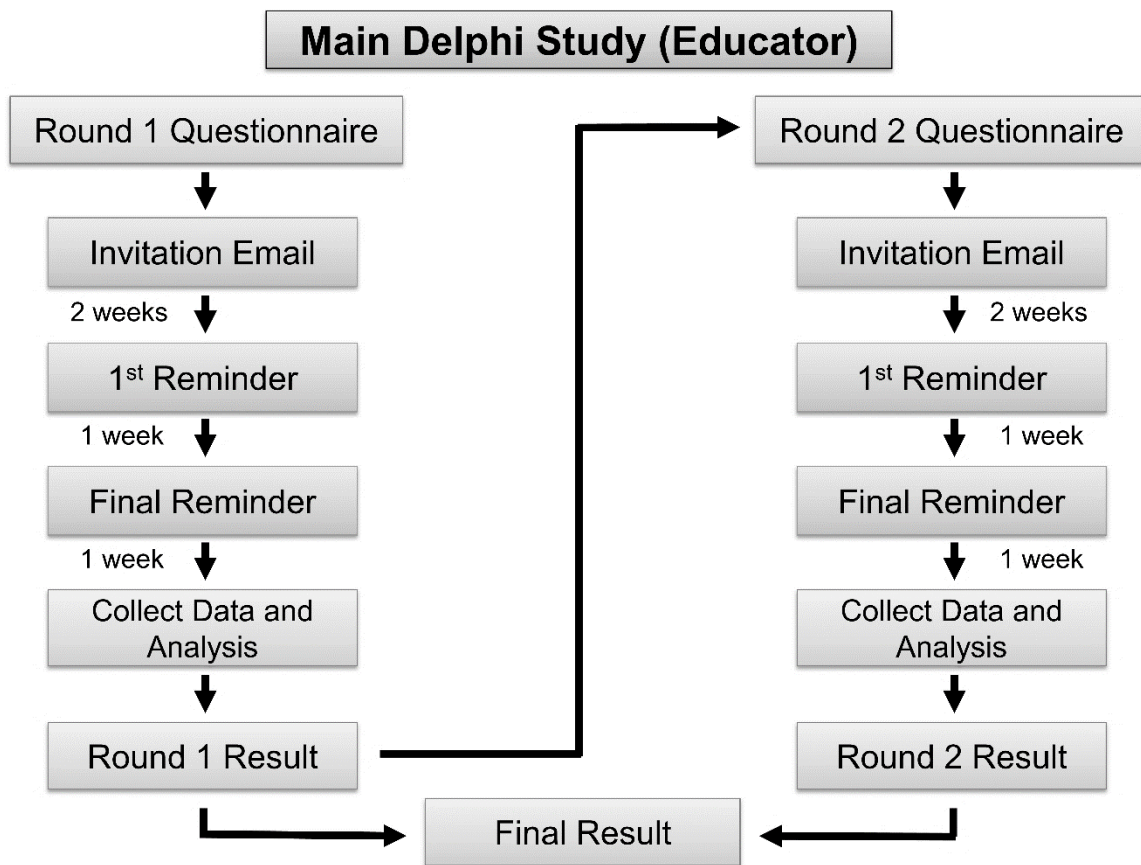


Figure 2 The data collection process of the student panel.

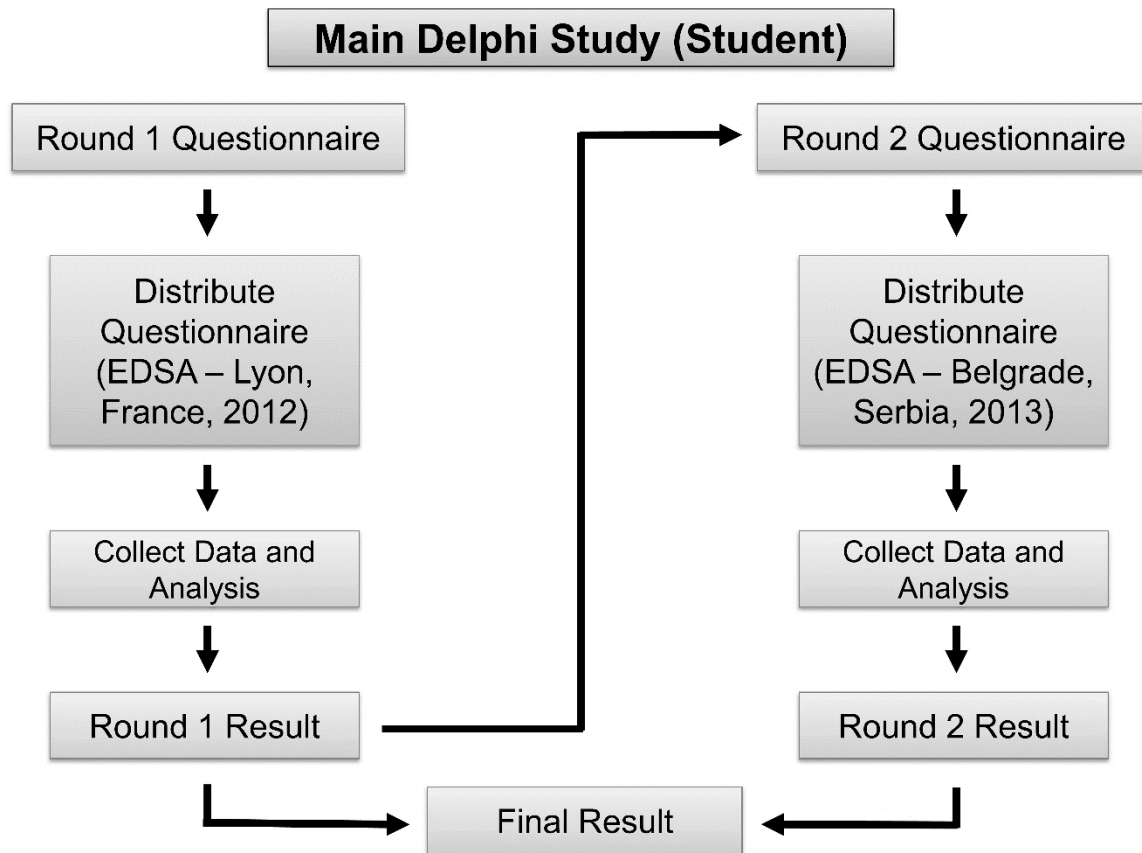


Figure 3 A structural analogue representing seven domains of the curriculum for educators of European undergraduate dental students.

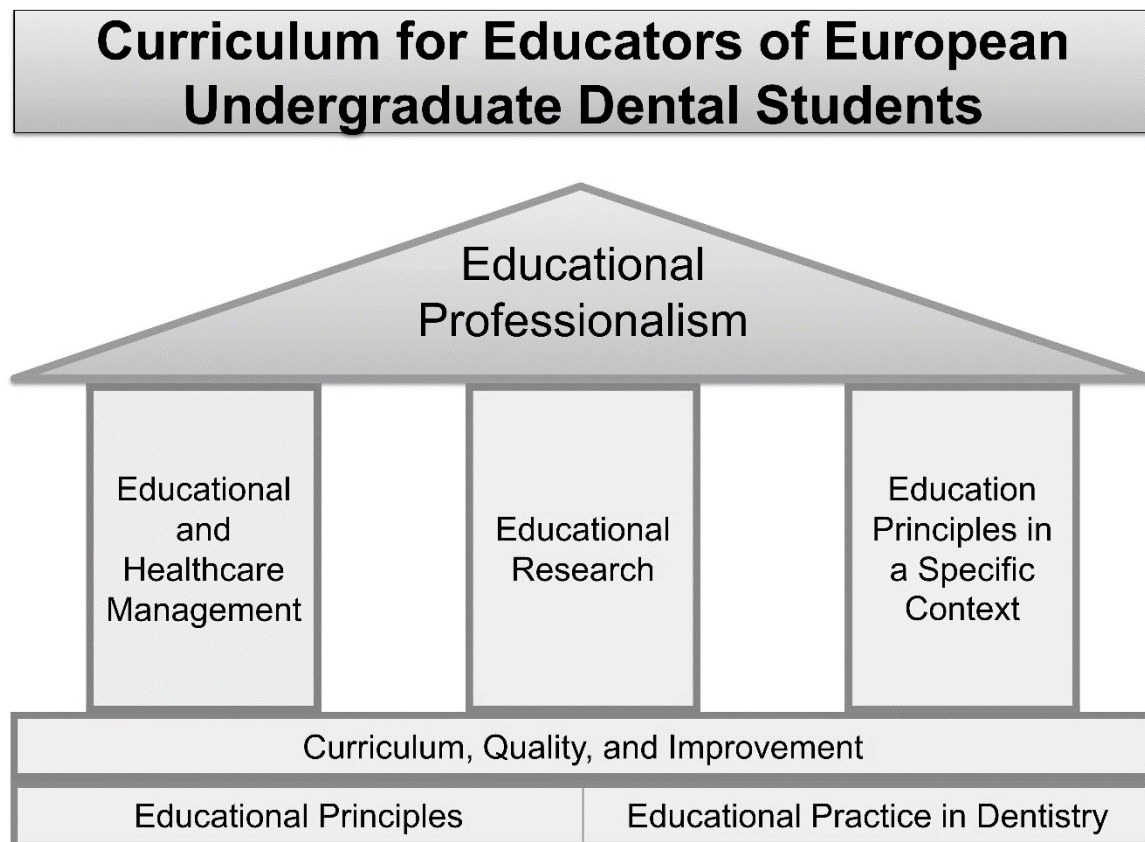


Table 1 The level of consensus defined in this study.

Category	Criteria
Consensus (Including)	<ul style="list-style-type: none"> ▪ At least 70% of participants rated 3 or 4 on that item and ▪ Mean ≥ 3.2 and ▪ SD ≤ 1.0
Non-Consensus	<ul style="list-style-type: none"> ▪ 30 – 69% of participants rated 3 or 4 on that item
	<ul style="list-style-type: none"> ▪ At least 70% of participants rate 3 or 4 on that item but <ul style="list-style-type: none"> ➢ Mean < 3.2 or ➢ SD > 1.0
Consensus (Excluding)	<ul style="list-style-type: none"> ▪ Less than 30% of participants rated 3 or 4 on that item

Table 2 Demographic information of the main study (educator panel).

Information		Round 1		Round 2	
Number of Participants		53		39 (73.6% RR)	
Gender	Male	33	62%	27	69%
	Female	20	38%	12	31%
Age	26 – 35	3	6%	3	8%
	36 – 45	8	15%	5	13%
	46 – 55	21	40%	16	41%
	56 – 65	16	30%	11	28%
	Over 65	5	9%	4	10%
Country	Eastern Europe	3	6%	1	3%
	Northern Europe	27	51%	20	51%
	Southern Europe	6	11%	5	13%
	Western Europe	17	32%	13	33%
Teaching Experience	Up to 5 years	5	9%	5	13%
	Between 6 and 12 years	9	17%	5	13%
	13 years and over	39	74%	29	74%
Academic Position	Full-time	39	74%	28	72%
	Part-time	14	26%	11	28%
	Average sessions per week (for Part-time)	6.3 (19 hours)		5.4 (16 hours)	
Proportion of the job which involves teaching undergraduate students	Up to 20 %	9	17%	7	18%
	21 – 40 %	22	41%	18	46%
	41 – 60 %	12	23%	7	18%
	61 – 80 %	3	6%	2	5%
	More than 80 %	7	13%	5	13%
Educational Environment which the participants have been involved or experienced	Classroom-Based	40	76%	30	77%
	Laboratory-Based	17	32%	12	31%
	Clinical-Based	33	62%	28	59%
	Outreach/Community/Workplace-Based	9	17%	6	15%
	Other (e.g. PBL)	10	19%	8	21%

Table 3 Demographic information of the main study (student panel).

Information		Round 1		Round 2	
Number of Participants		39		17 (43.6% RR)	
Gender	Male	15	38%	8	47%
	Female	23	59%	8	47%
	No Information	1	3%	1	6%
Age	Below 21	2	5%	2	12%
	21 – 30	37	95%	15	88%
Country	Eastern Europe	6	15%	2	12%
	Northern Europe	16	41%	7	41%
	Southern Europe	15	39%	7	41%
	Western Europe	2	5%	1	6%
Year of Study	Second Year	1	3%	1	6%
	Third Year	4	10%	2	12%
	Fourth Year	18	46%	7	41%
	Fifth Year	15	38%	7	41%
	Sixth Year	1	3%	-	-
Educational Environment which the participants have been involved or experienced	Classroom-Based	35	90%	16	94%
	Laboratory-Based	31	80%	13	77%
	Clinical-Based	39	100%	17	100%
	Outreach/Community/ Workplace-Based	18	46%	9	53%
	Other (e.g. PBL)	4	10%	-	-

Table 4 Number of consensus and non-consensus items (educator panel).

Topic	Number of Items	Round 1			Round 2		
		Consensus (Including)	Non-Consensus	Consensus (Excluding)	Consensus (Including)	Non-Consensus	Consensus (Excluding)
1. Educational Theories and Principles	7	7	-	-	-	-	-
2. Modes of Education	6	3	3	-	-	3	-
3. Learner's Issues	3	2	1	-	-	1	-
4. Educational Materials	2	2	-	-	-	-	-
5. Assessment and Feedback	6	6	-	-	-	-	-
6. Curriculum	3	3	-	-	-	-	-
7. Evaluation	2	2	-	-	-	-	-
8. Educational Research	2	-	2	-	-	2	-
9. Educational Management	5	-	5	-	1	4	-
10. Quality Assurance	3	2	1	-	-	1	-
11. Patient Care and Health Care System	2	1	1	-	-	1	-
12. Professionalism	10	9	1	-	-	1	-
Total	51	37	14	-	1	13	-
Total Consensus (Including)		38 (75%)					
Total Non-Consensus		13 (25%)					
Total Consensus (Excluding)		-					

Table 5 Number of consensus and non-consensus items (student panel).

Topic	Number of Items	Round 1			Round 2		
		Consensus (Including)	Non-Consensus	Consensus (Excluding)	Consensus (Including)	Non-Consensus	Consensus (Excluding)
1. Educational Theories and Principles	7	4	3	-	2	1	-
2. Modes of Education	6	4	1	1	-	1	-
3. Learner's Issues	3	1	2	-	-	2	-
4. Educational Materials	2	1	1	-	1	-	-
5. Assessment and Feedback	6	4	2	-	1	1	-
6. Curriculum	3	3	-	-	-	-	-
7. Evaluation	2	2	-	-	-	-	-
8. Educational Research	2	1	1	-	-	1	-
9. Educational Management	5	3	2	-	1	1	-
10. Quality Assurance	3	1	2	-	2	-	-
11. Patient Care and Health Care System	2	2	-	-	-	-	-
12. Professionalism	10	9	1	-	1	-	-
Total	51	35	15	1	8	7	-
Total Consensus (Including)		43 (84%)					
Total Non-Consensus		7 (14%)					
Total Consensus (Excluding)		1 (2%)					

Table 6 The core curriculum content

Educational Content	Educator			Student			A summary of issues
	%	Mean	Result	%	Mean	Result	
Domain 1 Educational Principles							
Topic 1.1 Principles of Teaching and Learning							
1. Learning: Styles & Approaches	96	3.6	CI	84	3.3	CI	<ul style="list-style-type: none"> ▪ Providing teaching which is congruent with students' learning styles ▪ Helping students to develop appropriate learning approaches ▪ Providing a variety of teaching styles/approaches to support students' different learning styles and approaches ▪ Using educational theories to underpin and maximise teaching ▪ Using educational evidence to inform teaching ▪ Selecting teaching and learning methods which are congruent with a specific culture/context ▪ Using technology to enhance teaching and learning ▪ Preparing and provide learning resources to support learning ▪ Creating and providing positive learning environment within/outside the educational context
2. Learning Resources, Educational Media & Materials	94	3.6	CI	87	3.4	CI	
3. Learning Environment	94	3.3	CI	88	3.1	NC	
4. Educational Strategies & Processes	92	3.5	CI	94	3.5	CI	
5. Evidence-Based Education	92	3.4	CI	92	3.4	CI	
6. Contemporary Teaching & Learning Methods	91	3.5	CI	87	3.4	CI	
7. Learning Theories	91	3.4	CI	94	3.5	CI	
8. Instructional Design	91	3.3	CI	88	3.2	CI	
Topic 1.2 Principles of Assessment							
9. Assessment Calibration	100	3.6	CI	87	3.1	NC	<ul style="list-style-type: none"> ▪ Using calibration to create fair assessment & improve assessment quality ▪ Basic principles of assessment (e.g. psychometric theory) ▪ Selecting appropriate, valid methods to measure student learning & achievement ▪ Using formative & summative assessment to help develop deep learning. ▪ Importance of constructive feedback to support student learning ▪ Selecting assessment methods in relation to learning domains and levels ▪ Developing educator competence via teaching & assessment practice
10. Assessment Methods & Instruments	94	3.6	CI	92	3.3	CI	
11. Assessment Principles	91	3.6	CI	94	3.3	CI	
Domain 2 Educational Practice in Dentistry							
Topic 2.1 Educator Teaching Strategies in Dentistry							
12. Teaching in the Clinical Setting	98	3.8	CI	97	3.7	CI	<ul style="list-style-type: none"> ▪ Developing professional competences & other essential skills in the clinical setting ▪ Using small group teaching to develop essential practice skills for their career ▪ Understanding when to intervene or give additional support to students ▪ Recovering situations caused by poor performance, clinical failure, or unforeseen circumstances ▪ Understanding evidence-based principles and processes ▪ Sharing experience with students about applying evidence into practice ▪ Developing lifelong learning skills through the evidence-based process ▪ Understanding chairside teaching and using reflection-in-action
13. Small Group Teaching	98	3.7	CI	95	3.6	CI	
14. Mentoring and Coaching	98	3.6	CI	92	3.6	CI	
15. Evidence-Based Clinical Practice	86	3.4	CI	95	3.6	CI	
16. One-to-One Teaching	79	3.3	CI	82	3.1	NC	
Topic 2.2 Student Learning Methods in Dentistry							
17. Reflective Practice	100	3.7	CI	95	3.6	CI	<ul style="list-style-type: none"> ▪ Understanding and assisting student to use reflective practice to develop learning

18. Feedback	98	3.8	CI	95	3.6	CI	<ul style="list-style-type: none"> ▪ Helping students use reflective practice to make sense of tacit knowledge ▪ Developing self-assessment skills and positive attitudes to self-assessment ▪ Providing constructive and culturally-congruent feedback to support learning ▪ Using immediate feedback to help students understand tacit knowledge ▪ How to recognise and assess student's good/bad performance
19. Performance Assessment	98	3.7	CI	92	3.5	CI	
20. Self-Assessment	98	3.6	CI	82	3.3	CI	
Topic 2.3 Learning Support in Dentistry							
21. Learner's Problems and Difficulties	92	3.5	CI	82	3.1	NC	<ul style="list-style-type: none"> ▪ Understanding learners' differences and cultural diversity ▪ Developing and utilising culturally-appropriate educational strategies ▪ How to identify students who need support & providing appropriate support
22. Support for Learners	92	3.4	CI	92	3.4	CI	
Domain 3 Curriculum, Quality, and Improvement							
Topic 3.1 Curriculum							
23. Programme & Course Development	96	3.6	CI	92	3.6	CI	<ul style="list-style-type: none"> ▪ Principles of outcome-based education, curriculum development & implementation ▪ How to arrange the educational process to be congruent with the curriculum ▪ How curriculum inform effective teaching and learning
24. Curriculum Implementation	87	3.2	CI	92	3.4	CI	
25. Curriculum Development	83	3.3	CI	90	3.5	CI	
Topic 3.2 Evaluation, Quality and Standards							
26. Teacher and Teaching Evaluation	92	3.6	CI	95	3.5	CI	<ul style="list-style-type: none"> ▪ Importance, purposes and focuses of evaluation ▪ How to evaluate teaching and student achievement ▪ How to gain involvement from stakeholders toward the evaluation process ▪ Evaluation models and using evaluation to improve teaching & curriculum quality ▪ Understanding QA & related issues for developing & improving teaching quality ▪ How to gain awareness of and positive perception toward quality assurance ▪ Using healthcare standards to inform teaching and maintaining practice quality in clinical teaching
27. Evaluation of Educational Programmes	88	3.6	CI	95	3.4	CI	
28. Health Care Quality and Standards	79	3.2	CI	100	3.7	CI	
29. Principles of Audit, Quality, Standards & QA	77	3.2	CI	94	3.5	CI	
30. QA Implementation & Development	75	3.2	CI	94	3.6	CI	
Topic 3.3 Leadership and Teamwork							
31. Leadership and Teamwork	87	3.3	CI	82	3.2	CI	<ul style="list-style-type: none"> ▪ Leadership skills relating to teaching roles and dental education contexts ▪ How to develop leadership skills in students
Domain 4 Educational Professionalism							
Topic 4.1 Ethics and Professional Characteristics							
32. Professional Ethics and Behaviour	96	3.8	CI	97	3.6	CI	<ul style="list-style-type: none"> ▪ Characteristics and attributes of a good teacher ▪ Understanding professional issues relating to education ▪ Being a good role model ▪ How to demonstrate and apply professionalism into the real professional context ▪ Effective communication skills for teaching and helping students learn ▪ How to maintain and improve knowledge and expertise
33. Professionalism Development	94	3.6	CI	92	3.6	CI	
34. Communication & Interpersonal Skills	92	3.6	CI	97	3.5	CI	
35. Personal Management Skills	85	3.3	CI	84	3.2	CI	
36. Personal & Professional Development	85	3.3	CI	97	3.6	CI	
Topic 4.2 Knowledge and Expertise							
37. Content Knowledge and Expertise	90	3.4	CI	92	3.5	CI	<ul style="list-style-type: none"> ▪ Using expert knowledge and expertise for informing effective teaching, encouraging students learning, and supporting students to develop thinking skills and professional competent
38. Clinical and Technical Skills	89	3.4	CI	100	3.9	CI	

% = Percentage of participants who rated 3 or 4 (i.e. level of consensus)

CI = Consensus (Including)

NC = Non-Consensus

Table 7 The optional curriculum content.

Educational Content	Educator			Student			A summary of issues
	%	Mean	Result	%	Mean	Result	
Domain 5 Education Principles in a Specific Context							
39. Inter-/Multi-professional Teaching	89	3.1	NC	87	3.3	CI	<ul style="list-style-type: none"> ▪ Importance and benefits of interprofessional education ▪ Developing and implementing interprofessional education ▪ How to gain awareness of & positive perception to interprofessional education ▪ Benefits of outreach education on students, dental professionals, and society ▪ Developing professional competences through outreach education ▪ How to improve and maintain educational quality of outreach education ▪ Basic knowledge of careers & professional development pathways in local contexts ▪ How to motivate and support students to achieve professional and career goal ▪ Knowledge about the nature of 'learners with special needs' ▪ How to recognise students' concerns/needs & refer for appropriate support ▪ Developing active engagement in effective large group teaching ▪ Cultural factors that influence the quality of large group teaching
40. Career Guidance Skills	87	3.1	NC	94	3.6	CI	
41. Outreach/Community Based/ Workplace-Based Teaching	81	3.0	NC	87	3.3	CI	
42. Learners with Special Needs	64	2.7	NC	77	3.0	NC	
43. Large Group Teaching	64	2.7	NC	21	1.9	CE	
Domain 6 Educational Research							
44. Educational Research and Methods	82	3.1	NC	84	3.2	CI	<ul style="list-style-type: none"> ▪ Principles of educational research ▪ Evaluating educational research to inform effective teaching and learning ▪ Components of educational research ▪ Processes of conducting and applying educational research
45. Research Components & Processes	72	3.0	NC	82	3.1	NC	
Domain 7 Educational and Healthcare Management							
<i>Topic 7.1 Educational Change and Management</i>							
46. Educational Change	76	3.0	NC	81	3.1	NC	<ul style="list-style-type: none"> ▪ Basic concepts of change and management that support educational development ▪ Essential management skills relating to the educational change, institution, and dental education
47. Educational System & Dent Educ	74	3.0	NC	82	3.3	CI	
48. Management & Organisation Principles in Dental Education	64	2.8	NC	85	3.3	CI	
<i>Topic 7.2 Student Admission</i>							
49. Student Recruitment and Admission	67	2.9	NC	88	3.4	CI	<ul style="list-style-type: none"> ▪ How admissions relate to the whole dental education and the curriculum ▪ How to develop an effective student recruitment and admission process
<i>Topic 7.3 Regulatory Bodies and Healthcare System</i>							
50. Local/National QA & Regulatory Bodies	79	3.0	NC	82	3.2	CI	<ul style="list-style-type: none"> ▪ Developing awareness & understanding of regulatory bodies & healthcare systems ▪ Understanding how regulatory bodies & healthcare systems may benefit teaching & learning ▪ Helping students to understand future career environments (healthcare system)
51. Healthcare System & Management	76	3.0	NC	95	3.6	CI	

% = Percentage of participants who rated 3 or 4 (i.e. level of consensus)

CI = Consensus (Including)

NC = Non-Consensus

CE = Consensus (Excluding)