Senior academics' perceptions of undergraduate prosthodontics curriculum and teaching: a qualitative study

Précis

Divergence in undergraduate teaching methods in prosthodontics could impact on graduate dentists' competence and affect patient safety, especially with mobility of dentists internationally. This study highlights the need to minimise this divergence.

Abstract

Introduction: Divergence in undergraduate teaching methods in prosthodontics is widely reported, and this could impact on graduate dentists' competence and affect patient safety.

Objectives: To explore the perspectives held by senior dental academics worldwide regarding the undergraduate prosthodontics curriculum, teaching and assessment methods, and teaching staff profile.

Materials and methods: Twelve senior dental academics from seven countries participated in semi-structured interviews exploring their perspectives and opinions of the undergraduate prosthodontics curriculum, and current and best teaching and assessment methods. Interviews were undertaken virtually, video-recorded and auto-transcribed. Semantic thematic analysis was used for data analysis.

Results: Academic professors, consultants and specialists were considered the most suitable staff members to supervise students during preclinical hands-on sessions due to their experience level. Additionally, participants mentioned the availability of suitable patients for treatment, dental schools' curricula, and the level of students' skills as factors influencing the start of clinical sessions in fixed prosthodontics. The course contents and the extent of teaching on dental implants were different between schools. Tailoring the curriculum according to what is expected from the graduating dentists and allowing students to observe dental implant cases before dealing with simple cases were suggestions made by the participants, to include an implant course at undergraduate level.

Conclusions: Despite some differences in opinions and current practices in different institutions, barriers to the implementation of an ideal curriculum seemed to be similar in the different institutions. This study provided deeper understanding of the current divergence in prosthodontics teaching, which would allow for future improvement in the dental curriculum.

Journal of the Irish Dental Association Published online December 2022

Introduction

Prosthodontics is a broad and complex course consisting of four main disciplines: complete dentures (CDs); removable partial dentures (RPDs); fixed prosthodontics (FPs), (which include crowns and bridges); and, dental implants (DIs). Learning of these disciplines may start at the early stages of dentistry courses and continue until the completion of the bachelor's degree.[1] Traditionally, undergraduate dental education engages students in lectures for basic sciences along with dental sciences and laboratory settings during the first two years of their preclinical training. Afterwards, clinical subjects and training are introduced until the end of the programme, followed by one year of internship or vocational training (dental

Dr Khaleel Al Khalaf
BDS MDSc PhD
Restorative Dentistry Department, University Dental School and Hospital, University College Cork, and Prosthodontics Department, Dammam Specialist Dental Centre, Dammam Medical Complex, Dammam, Saudi Arabia

Prof. Christopher D. Lynch
DDSc PhD FDS (Rest Dent) RCSI PFHEA
Professor/Consultant in Restorative Dentistry
Restorative Dentistry Department, University Dental School and Hospital, University College Cork

Dr Cristiane da Mata
BDS MFD(RCSI) MPH PhD
Lecturer in Restorative Dentistry
Restorative Dentistry Department, University Dental School and Hospital, University College Cork

Corresponding author: Dr Khaleel Al Khalaf BDS MDSc PhD, Restorative Dentistry Department, University Dental School and Hospital, University College Cork E: k.alkhalaf@umail.ucc.ie; k.alkhalaf@live.co.uk

Table 1: Study participants' demographic information.

Sequence number	Participant's title	Years of experience	Country
01	Consultant/Senior Lecturer*	Less than 5 years	Ireland
02	Professor**	More than 15 years	New Zealand
03	Professor	More than 20 years	Singapore
04	Consultant/Senior Lecturer	More than 10 years	United Kingdom
05	Associate Professor	More than 20 years	United States
06	Assistant Professor	Less than 10 years	Singapore
07	Professor	More than 20 years	United Kingdom
08	Assistant Professor	Less than 10 years	Qatar
09	Associate Professor	More than 20 years	Australia
10	Professor	More than 15 years	United States
11	Professor	More than 10 years	United Kingdom
12	Associate Professor	Less than 10 years	Ireland

*Professor, associate professor, assistant professor and senior lecturer are academic titles.
**All professors were consultants but not all consultants were professors.

foundation training) in some countries.

However, dental school programmes around the world are not similar and programme curricula are tailored according to various aspects such as available resources, but mostly according to local dental council guidelines. As a result, discrepancies in undergraduate prosthodontics curricula, and dental students' teaching and assessment methods, can be seen nationally and internationally.[2,3] In addition, discrepancies in the teaching and assessment methods of the four disciplines in prosthodontics have also been reported in the literature.[4-11] These differences encouraged organisations such as the Association for Dental Education in Europe (ADEE) to set a well-justified and harmonised basis for training high-quality dentists by promoting convergence towards a higher standard of dental education, training and service to the ultimate benefit of patients. Furthermore, the ADEE called on dental schools for further refinement and harmonisation of the dental undergraduate curricula across Europe, which are also recommended to be applied internationally.[12]

In the first phase of this study, a comprehensive survey was conducted using the Delphi method.[13] Delphi methodology is a process used to arrive at a group opinion or decision by surveying a panel of experts. It has been used to determine the range of opinions on particular matters, to test questions of policy or clinical relevance, and to explore or achieve consensus on disputed topics.[14] The aim was to investigate what the best teaching and assessment methods in prosthodontics are, and to attain consensus among senior academics in dental schools internationally. Although consensus was achieved in the majority of the areas assessed, there were still some divergent opinions regarding some teaching and assessment methods, such as "who would be most suitable to supervise students during the hands-on/practical skills sessions?", and "who would be most suitable to supervise students during the clinical sessions?".

Therefore, this qualitative study aimed to further explore the perspectives and opinions held by senior dental academics worldwide regarding undergraduate prosthodontics teaching and assessment methods.

Materials and methods

Participants and setting

The study participants included senior dental academics who are active in teaching undergraduate prosthodontics, nine of whom had taken part in Phase 1 of this study (Delphi study).[13] An invitation email was sent including the study information leaflet, the consent statement and a hyperlink to a meeting organiser form using Google Forms. Participation in the study was voluntary and completing the meeting organiser form was considered an agreement to participate. In addition, verbal consent was obtained at the beginning of each interview. The interviews were conducted until data saturation was reached. This is when the participants' responses do not provide new information or new themes for analysis.[15]

Ethical approval

Ethical approval (Log 2021-063A1) for this study was granted on February 4, 2022, by the Social Research Ethics Committee (SREC) at University College Cork, Ireland.

Interview procedure

A semi-structured interview guide, including nine open-ended questions followed by prompting questions to probe into details, was followed during interviews to elicit responses about current and best teaching and assessment methods in undergraduate prosthodontics. Topic guide questions were taken from our previous work using the Delphi method, and these included questions that had not reached consensus. The interviews were conducted virtually via Microsoft Teams or Zoom. Interviews were undertaken in March 2022 and lasted between 10 and 30 minutes; they were video-recorded, auto-transcribed, and all transcripts were checked by the lead researcher to ensure verbatim transcriptions.

Thematic analysis process and coding

After transcription, phrases were first coded into "current teaching and assessment methods", "ideal or best teaching and assessment methods", and "sub-themes", such as "teaching challenges and their resolution". The initial codes were then peer validated by a second researcher to ensure the rigour and appropriateness of the codes (NVivo 12 Software).

Results

Twelve senior dental academics who are active in teaching undergraduate prosthodontics participated in this study (five professors, three associate professors, two assistant professors and two consultants/senior lecturers). The participants were from seven countries, namely Australia, Ireland, New Zealand, Qatar, Singapore, United Kingdom, and United States (**Table 1**). Out of the 12 interviews, 322 phrases were identified and coded, followed by thematic analysis. These phrases were assigned to nine main themes and a number of sub-themes associated with ideal teaching methods, challenges in teaching, and how the challenges could be resolved (**Figure 1**).

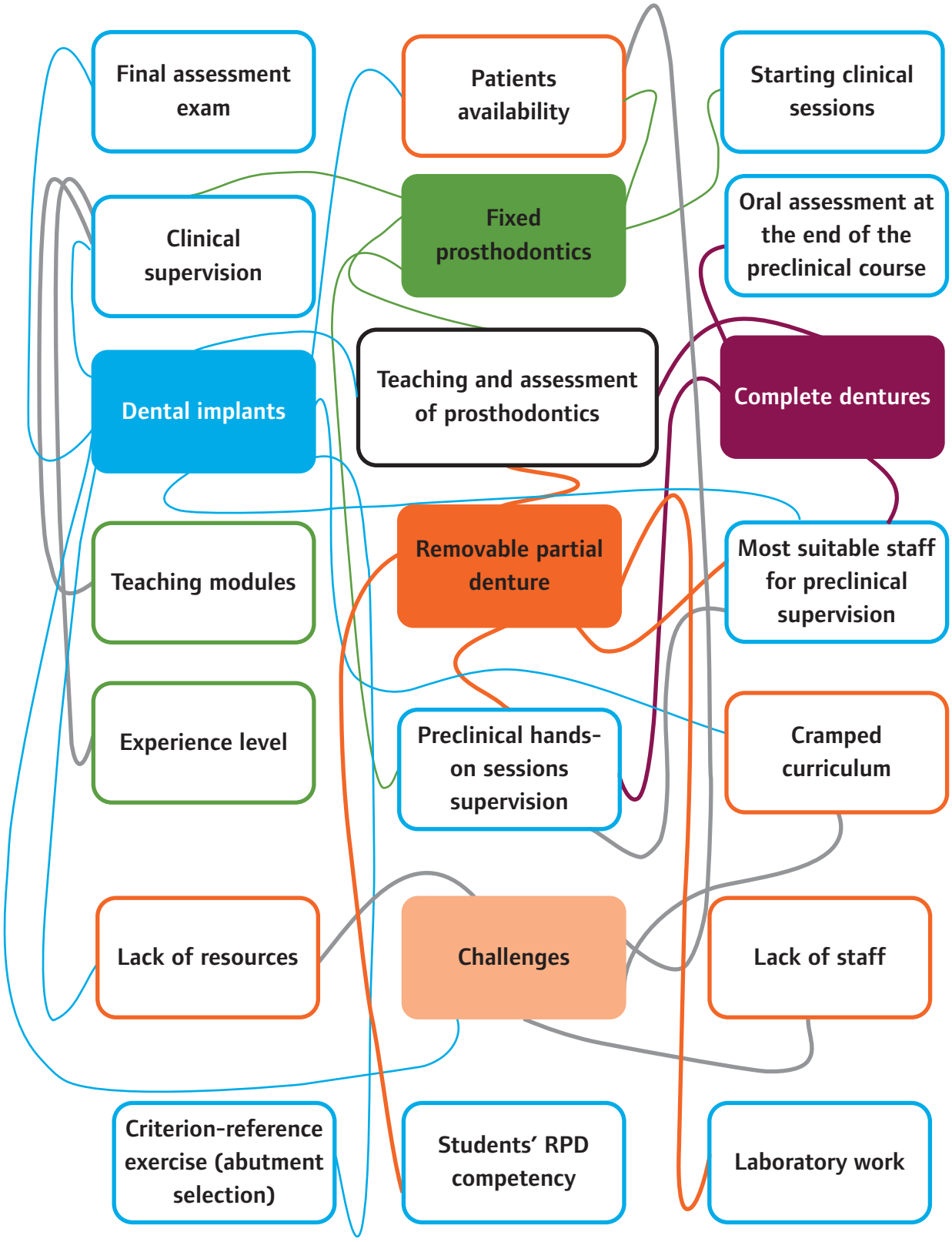

FIGURE 1: Study's emerging themes and sub-themes.

Teaching and assessment methods in removable and fixed prosthodontics

Five participants stated that senior lecturers currently supervise students during the hands-on preclinical sessions on the CD, RPD and FP courses in their teaching institution. In the remaining schools, these sessions are supervised by consultants or specialists (4), general dentists (2) and lecturers (1).

Experience was considered the most important factor in deciding who is the best member of staff to supervise students in the pre-clinical hands-on sessions:

"…depending on the experience rather than the actual title if you like…" (04).

"…it's important when you're given the preclinical and all the theory that it's someone with some academic background as well as having their clinical expertise in that area…" (12).

A lack of academics at professor level was one of the reasons for members of staff at junior level to currently supervise students in some institutions:

"…few clinical academics who are professors. We've got four, and so, the reason I selected senior lecturer was because of that…" (02).

The majority of participants believed that the beginning of clinical sessions of FP should happen in the third year of the course (6). Three participants stated that beginning these sessions in fourth year is ideal:

"…I would say third, if the earlier the better to start always, but you need to consider what are the previous experiences or where it's located in relation to other disciplines in the curriculum? … So, it's never that alone, it's that in combination with a multitude of other things…" (05).

"…In fourth year, because the students have time to develop the skills to get patients dentally fit as well before doing fixed prostheses…" (02).

Applying an "integrated curriculum" in one dental school allows students to start the clinical FP sessions during the second year.

Table 2 illustrates the teaching staff currently supervising students in CD and RPD clinical sessions.

Participants from dental schools that have lecturers and general dentists to supervise CD and RPD clinical sessions explained that:

"…For conventional dentures and partial dentures, I would be OK with it being a generalist, and again, that could be somebody at lecturer level … generalist because they are the ones treating more cases of CDs and RPDs, and the amount of people who are comfortable teaching removable prostheses, in my experience, is going in that direction…" (pointed down) (03).

Most participants' opinions were that those who supervise students in clinical sessions should be familiar with module teaching:

"…they do not have to be involved with the teaching of the module, but they should be familiar with it…" (07).

Some 50% of participants (6 out of 12) believed that it is important for students to complete the laboratory work of the acrylic RPD (one to two cases) by themselves in order to gain experience:

Table 2: Teaching staff supervising students during the clinical sessions of removable prosthodontics (CD and RPD).

Staff member level	Number of dental schools
Consultant/specialist	3
Senior lecturer	4
Lecturer	2
General practitioner	2
Dental technician	1
Total	**12**

"…I don't think it's important that they do all of their own lab work, but I think it's useful for them to get experience, one or two cases just to get experience…" (03).

The other half considered it "not important" but desirable. The lack of resources or the overcrowded curriculum were reasons why it is not currently done in those schools:

"…I would say that it would be ideal if they could do the lab work, but practically the reason that we don't sustain that now is because of the curriculum. We just don't have space so ideally, yes, practically, no…" (02).

The majority of participants (9 out of 12) believed that oral assessments at the end of preclinical CD courses are not important.

"…if you're looking to assess theoretical knowledge, I don't think oral examination is the best way to do it. I prefer competency testing…" (03).

"…if you're doing a good simulation assessment or a good clinical assessment associated with a written exam…well, you don't need an oral examination…" 0(05).

Teaching and assessment methods in dental implants course

Half of the participants (6 out of 12) have a DI course, either preclinical only or preclinical and clinical, and consultants or specialists were considered to be the most suitable members of staff to supervise students in six dental schools, whereas senior lecturers (5) and lecturers (1) were considered suitable in the remaining schools.

Most of the participants considered DIs too advanced for undergraduate level or difficult to teach due to overcrowded curricula:

"…as things progress that may change in the future where restoring implants may become part of the undergraduate curriculum but at the moment I don't see space for that and I don't see it as a priority…" (01).

"…I think it's probably too advanced, certainly in our institution, we cannot incorporate that as part of the undergraduate education, but it is important for them to know the theoretical steps. I think beyond the scope of undergraduate education at the moment – five-year course…" (04).

Four out of the six dental schools that have a DI course set a minimum competence level for their students:

"…I would say, a single tooth for replacement, like a single crown and overdenture,

lower overdenture case. I think that would be the minimal competence they should be able to do. It executes the prosthodontic phases…" (05).

Challenges in undergraduate prosthodontics teaching

Some challenges regarding teaching of the undergraduate prosthodontics course were identified during this study and solutions to these were also suggested by participants.

An overcrowded curriculum was considered by participants to be one of the greatest challenges in the teaching of undergraduate prosthodontics. It was pointed out as an obstacle to building students' skills and to adding new course material to the curriculum:

"I think there's a lot to fit into the undergraduate curriculum, and treatment has become more complex…I think there is a challenge to get them enough experience and enough cases and treating…" (01).

Updating the curriculum regularly and starting the clinical sessions as early as possible were suggested as ways to overcome this problem.

Participants considered the curriculum, patient availability, and lack of resources as barriers to incorporating the teaching of DIs at undergraduate level:

"…Ideally yes, teaching dental implants in the programme…the more that we can have students competent on graduation across the full range of industry the better…" (02).

"…Practically, it becomes quite difficult to actually make it really effective because of the surgical disciplines and availability of patients…" (02).

Participants suggested some ways of incorporating/including DI teaching into the undergraduate curriculum, such as adjusting the curriculum according to what is expected from the graduating dentists, and allowing students to observe DI cases and then start dealing with simple and straightforward cases.

Discussion

This qualitative study explored topics in prosthodontics teaching and assessment methods. We demonstrated the divergence between participating dental schools and revealed to some extent the background of this divergence, which enabled us to understand the views of senior academics from four different continents. Nine prosthodontics teaching and assessment topics that did not reach consensus in our previous study[13] were investigated. Of them, only the oral assessment at the end of the preclinical CD course topic reached consensus (not important) among the participants (9 out of 12). In comparison, the divergence in the remaining topics was clear between the participating dental schools. This divergence is attributed to several factors, such as the overcrowded curriculum, lack of experienced senior academics and lack of resources. In addition, the difference in the participants' opinions was clear between what teaching or assessment methods are currently used and what is ideal or should be applied. However, the ideal method was not always similar between the participants. For instance, some participants believed that teaching the prosthetic part of the DI course is the ideal. On the other hand, some participants believed that being familiar with the DI indications and considerations and then referring the patient is the ideal at undergraduate level.

During the preclinical hands-on practical sessions in CD, RPD and FP, the majority of participants agreed that the level of experience is the most important factor in determining who is the most suitable to supervise students. These findings are similar to what was reported by Lynch *et al.* as they reported that members of staff who most currently supervised the removable prosthodontics clinical sessions were senior lecturers, followed by consultants or specialists.[7] However, dental schools that selected junior members of staff to supervise the removable prosthodontics sessions did so either due to the refusal of some members of staff to supervise these sessions, or due to the lack of senior academic members, as previously reported.[8] Overall, the staff's level of experience was considered as an important factor when deciding who should supervise students.

Being involved in the module teaching was also found to be the most important consideration when choosing the most suitable members of staff to assess students' competence level during RPD clinical sessions. In regard to students' completion of laboratory work on their own RPD cases, half of the participating schools considered it important for students to complete at least one or two cases in order to gain experience, whereas schools that did not consider the laboratory work as an important skill for their students mentioned lack of resources and overcrowded curriculum as challenges they face.

Moreover, half of participating schools commence the FP clinical sessions in year three of the five-year course, followed by year four, which is comparable to the findings of a previous study.[2] However, applying an integrated curriculum allows one school to commence the FP clinical sessions in year two. Commencing FP clinical sessions was also reported to be subject to various factors, such as the availability of suitable patients for treatment, the school's curriculum and the level of student skills. In 2017, a study reported that early clinical exposure in prosthodontics will help to solve many problems encountered during learning and contribute to a better understanding.[1] Similarly, two studies in 2018 and 2020 found that students' confidence levels in carrying out prosthodontics treatment would be improved further by increasing clinical experience.[16,17]

DI course material complexity and the staff's level of experience were the main reasons for participating schools to select consultants or specialists as the most suitable members of staff to supervise the preclinical hands-on sessions, and the clinical sessions if available. Dental schools that set a minimum competency level for their students expect them to know how to assess patients, treatment plan, be familiar with medical considerations, and restore at least one or two DIs (prosthetic part only). Most of the participants believed that the DI course is too advanced for undergraduate students and it is only suitable for postgraduate students. In contrast, the ADEE[12] and the European Workshop of Dental Implant Education[18,19] recommend that dental schools update their curricula and incorporate a DI course in undergraduate programmes.

The overcrowded curricula, lack of resources and the lack of availability of patients were found in the current study to be the contemporary challenges that prevent some of the participating dental schools from teaching DIs; similar challenges were reported by Chin *et al.* in 2018.[20] Tailoring the curriculum according to what is expected from the graduating dentists and allowing students to observe DI cases before dealing with simple and straightforward cases were suggested as ways of overcoming some of these challenges. It was recommended that further development and improvement of implant teaching in dental undergraduate schools in the UK and Ireland are required, particularly with respect to the amount of direct clinical experience provided.[20] It was also suggested by a recent study that knowledge of DIs should be enhanced among undergraduates by conducting more structured teaching programmes, and this should positively impact on dentists' future clinical practice.[21]

Conclusion

This qualitative study presented a deeper understanding of the current divergence in prosthodontics teaching and assessment methods. These results could be considered as a reference to develop recommendations for stakeholders involved in undergraduate curricula in dental schools worldwide.

References

1. **Shigli, K., Jyotsna, S., Rajesh, G., Wadgave, U., Sankeshwari, B., Nayak, S.S., *et al.*** Challenges in learning preclinical prosthodontics: a survey of perceptions of dental undergraduates and teaching faculty at an Indian dental school. *J Clin Diagn Res* 2017; 11 (8): ZC01-ZC05.
2. **Lynch, C.D., Singhrao, H., Addy, L.D., Gilmour, A.S.M.** The teaching of fixed partial dentures in undergraduate dental schools in Ireland and the United Kingdom. *J Oral Rehabil* 2010; 37 (12): 908-915.
3. **Petersson, K., Olsson, H., Söderström, C., Fouilloux, I., Jegat, N., Lévy, G.** Undergraduate education in endodontology at two European dental schools. A comparison between the Faculty of Odontology, Malmö University, Malmö, Sweden and Faculty of Odontolgy, Paris 5 University (rené Descartes), France. *Eur J Dent Educ* 2002; 6 (4): 176-181.
4. **Petropoulos, V.C., Rashedi, B.** Complete denture education in US dental schools. *J Prosthodont* 2005; 14 (3): 191-197.
5. **Petropoulos, V.C., Rashedi, B.** Removable partial denture education in US dental schools. *J Prosthodont* 2006; 15 (1): 62-68.
6. **Petropoulos, V.C., Arbree, N.S., Tarnow, D., Rethman, M., Malmquist, J., Valachovic, R., *et al.*** Teaching implant dentistry in the predoctoral curriculum: a report from the ADEA Implant Workshop's survey of deans. *J Dent Educ* 2006; 70 (5): 580-588.
7. **Lynch, C.D., Allen, P.F.** The teaching of removable partial dentures in Ireland and the United Kingdom. *Br Dent J* 2007; 203 (8): E17.
8. **Loch, C., Brunton, P.A., Rahim, Z.A., Liew, L., Lynch, C., Wilson, N., *et al.*** The teaching of removable partial dentures in dental schools in Oceania. *J Dent* 2020; 95: 103309.
9. **Clark, R., Radford, D., Juszczyk, A.** Current trends in complete denture teaching in British dental schools. *Br Dent J* 2010; 208 (5): E10.
10. **Clark, R., Radford, D.R., Juszczyk, A.** Current trends in removable partial denture teaching in British dental schools. *Br Dent J* 2011; 211 (11): 531-535.
11. **Koole, S., Vandeweghe, S., Mattheos, N., De Bruyn, H.** Implant dentistry education in Europe: 5 years after the Association for Dental Education in Europe consensus report. *Eur J Dent Educ* 2014; 18 (Suppl. 1): 43-51.
12. **Field, J.C.J., Walmsley, D. (eds.).** *The Profile of Undergraduate Dental Education in Europe.* Dublin: Association for Dental Education in Europe, 2017.
13. **Al Khalaf, K., Moore, C., McKenna, G., da Mata, C., Lynch, C.** Undergraduate teaching and assessment methods in prosthodontics curriculum: an international Delphi survey. *J Dent* 2022: 104207.
14. **Iqbal, S., Pipon-Young, L.** The Delphi method. *The Psychologist* 2009; 22 (7): 598-601.
15. **Saunders, B., Sim, J., Kingstone, T., Baker, S., Waterfield, J., Bartlam, B., *et al.*** Saturation in qualitative research: exploring its conceptualization and operationalization. *Qual Quant* 2018; 52 (4): 1893-1907.
16. **Puryer, J., Woods, K., Terry, J., Sandy, J., Ireland, A.** The confidence of undergraduate dental students when carrying out prosthodontic treatment and their perception of the quality of prosthodontic education. *Eur J Dent Educ* 2018; 22 (1): e142-e148.
17. **Sampaio-Fernandes, M., Dutra, M., Oliveira, S.J., Reis-Campos, J.C., Azevedo, Â., Figueiral, M.H.** Students' self–confidence and perceived quality of prosthodontics education: a study in the Faculty of Dental Medicine of the University of Porto. *Eur J Dent Educ* 2020; 24 (3): 559-571.
18. **Sanz, M., Meyle, J.** Scope, competences, learning outcomes and methods of periodontal education within the undergraduate dental curriculum: a consensus report of the 1st European Workshop on Periodontal Education – position paper 2 and consensus view 2. *Eur J Dent Educ* 2010; 14 (Suppl. 1): 25-33.
19. **Sanz, M., Noguerol, B., Sanz-Sanchez, I., Hammerle, C.H., Schliephake, H., Renouard, F., *et al.*** European Association for Osseointegration Delphi study on the trends in implant dentistry in Europe for the year 2030. *Clin Oral Implants* Res 2019; 30 (5): 476-486.
20. **Chin, J., Lynch, C., Rees, J., Locke, M., Thomas, M.B., Addy, L.D.** Teaching of implant dentistry in undergraduate dental schools in the UK and Ireland. *Br Dent J* 2018; 225 (8): 763-768.
21. **Swapna, B., Jyothy, J.R., Suvvati, P.** Awareness and knowledge about dental implants among undergraduate students. *Indian Journal of Dental Advancements* 2021; 12 (2): 40-48.

CPD questions

To claim CPD points, go to the MEMBERS' SECTION of www.dentist.ie and answer the following questions:

IDA irish dental association

CPD

1. The Association for Dental Education in Europe (ADEE) was encouraged to set a well-justified and harmonised basis for training high-quality dentists because:

- ○ A: There are discrepancies in undergraduate dental students' teaching and assessment methods
- ○ B: Dental curricula should be the same everywhere
- ○ C: Dentists are not currently being well trained
- ○ D: The Dental Councils should not influence curricula

2. Programme curricula in dental schools are tailored according to various aspects such as:

- ○ A: Available resources
- ○ B: Local dental council guidelines
- ○ C: Patient needs
- ○ D: All of the above

3. In this study, what were considered the barrier(s) that prevent dental schools from incorporating the teaching of dental implants at undergraduate level?

- ○ A: Overcrowded curriculum
- ○ B: Patient availability
- ○ C: Lack of resources
- ○ D: Dental implants course is too advanced for undergraduate students
- ○ E: All of the above