

150 years of dental education and research – University of Birmingham School of Dentistry

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Key points

The University of Birmingham School of Dentistry opened its doors to students in 1858 and has seen many changes and developments in both education and research.

The diversity of our profession has widened significantly in recent times.

Cultivating a deep approach to learning through research focus and experience is essential for every student studying towards a dental-related degree, to promote inquiring minds and provide a foundation necessary for professional development.

Abstract

This paper discusses the historical development of dental education and research over the last 150 years from a Birmingham School of Dentistry perspective. The School opened its doors to students in 1858 and has seen many changes and developments in both education and research. Looking back throughout the history, one of our greatest abilities as dental professionals is to be adaptable and the future will bring plenty of opportunity for us to demonstrate this. We have seen how resilient dentistry has been over the COVID-19 pandemic, both in terms of education and research; the next 150 years will be a very exciting time to work in the field.

Introduction

Birmingham Dental Hospital opened its doors as Birmingham's Dental Dispensary in January 1858 at 13 Temple Street and is believed to be the oldest dental hospital in the world. The first of six moves was in 1863 to Upper Priory; the second was in 1871 to number 9 Broad Street; the third in 1882 to 71 Newhall Street; the fourth in 1905 to 132 Great Charles Street; and the fifth was in 1964 to St Chads Queensway, where it remained for 59 years until relocating to the current building. Interestingly, all six previous locations were within a 10–15-minute walk of each other.

Iain Chapple: major developments at Birmingham Dental School since its founding

Medical and dental students have trained at Birmingham since 1878. The Dental School was formally constituted in 1880 and its qualification was approved by the Royal College of Surgeons

in 1881. The formal degree is the oldest in the world, closely followed by Baltimore Dental School (USA).

Birmingham University Dental Student's Society (BUDSS) is also the oldest in the world, being founded in 1886. Dr Charles Sims, senior honorary dental surgeon at Birmingham Dental Hospital was inaugural staff president of BUDSS. The first society meeting was 4 November 1886 where fourteen members attended for the 'reading and discussing of papers for the furtherance of dental science among its members'. BUDSS went into abeyance for four years between 1915–1919 for the Great War and a roll of honour located outside the lecture theatres displays every BUDSS staff and student officer from 1886–2022. One notable alumnus was Harold Round, who in 1899 served as BUDSS secretary and then staff president in 1903. Round, alongside his collaborator Arthur Parrott, invented the first air bag, originally for First World War Royal Air Force pilots to prevent jaw fractures. The patent was filed in 1919 along with original drawings and on 18 March 2019, the Dental School celebrated 100 years of the air bag thanks to Professor Jonathan Reinartz, professor of the history of medicine, when a blue plaque was unveiled by Professor Chapple (Head of School in 2019) and Professor Reinartz. The plaque sits proudly

outside the Dental School/Hospital at 5 Mill Pool Way, Edgbaston, site of the former BBC Pebble Mill studios.

The current building was officially opened on 19 November 2015 by Her Majesty Queen Elizabeth II, although doors opened to patients on 31 March 2016. It occupies a stunning site in leafy Edgbaston, a stone's throw from the famous cricket ground and boasts 16,456 m² of state-of-the-art clinics, educational and research facilities. This seventh home for the Dental School/Hospital is the first non-city centre site in its long history. The modern facilities were vital to a rapid recovery of services following cessation of clinical activity on 25 March 2020 due to the COVID-19 pandemic. Students were sent home on 27 March 2020 for three months. During that time, care homes and community COVID-19 testing services relocated to the Dental Hospital as an operational hub. Haematology outpatients relocated from the Queen Elizabeth Hospital to the open plan student clinics for vulnerable patients, with our dental nurses working as phlebotomists. In June 2020, we ran the largest COVID seroepidemiology study in the world for oral healthcare professionals, testing 1,500 people and following their antibody status for nine months through the first vaccinations. Our second-year students were able to return the first week of July 2020 to the clinical skills laboratory after just three months. All students returned on

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7 September 2020 and after an investment of circa £0.5 million by the Trust to erect partition screens between open bays, we were the first UK dental hospital to recommence aerosol generating procedures between 1 October and 30 November 2020. Thanks to this superb facility, all students graduated in July 2020.

Joanna Batt: changes in the nature and demographics of applicants in recent times

This year (2022), we returned to face-to-face interviews as part of the selection process for entry to the Bachelor of Dental Surgery (BDS) degree programme at the University of Birmingham. On the first morning of interviews, I briefed twenty, very nervous looking, masked faces and it struck me how different things are now compared to two years ago, never mind when I applied to study dentistry 20 years ago. This made me consider today's applications process compared to 20, 30, 40 years ago.² How might these change in the coming years?

Gender balance within the profession is becoming more equal. In 1972, 12.8% of General Dental Council (GDC)-registered dentists were women, rising to 32% in 2000.¹ By 2020, 49% of dentists registered with the GDC self-identified as men, and 51% women.³ Given the historical male majority within the profession, it is not surprising to see that in 2020, 62% of dental school admissions were women.⁴

The diversity of our profession has widened significantly in recent times. At the time of writing, 27% of our enrolled BDS students identified as white, with the majority identifying as Asian. The GDC states that 52% of dentists registered identify as white, 24% as Asian or Asian British, but much smaller numbers identify as Black or Black British. There is a lack of representation within the profession from a variety of minority ethnic groups and this is an area we are working hard on to promote inclusivity. A recent article in the *British Dental Journal* eloquently illustrates this complex issue⁵ and efforts should be made to increase representation from under-represented groups within the profession.

So what does the future hold? My hope is that we gain a workforce that represents the patients we all treat and we enable students, regardless of background, to be supported in their journey to the dental professions. A mammoth task, yes, but one we are working towards and making significant progress.

Open Patel: changes in methods of dental education

The delivery of dental education is an evolving practice and has gained significant pace owing to enhancements in dental technologies becoming mainstream, coupled with the challenge of traditional paradigms of teaching and learning. Our dental students are keen to question and not simply accept facts. They want to learn at their pace, not the pace of the teacher standing in front of them. They do not accept it is important to learn, until they are shown and understand why it is important. Student expectation entering a modern degree programme is to receive bespoke support, teaching and learning on an individual-level, not as part of a student body.

To satisfy ever-evolving learners, we need to innovate our learning styles. Lectures now include the use of audience-response systems to enable active, individual learning in a familiar and efficient large-group setting. Recorded lectures can be reviewed at a time convenient to the individual learner. Virtual learning environments provide the learner with a bespoke resource that is signposted and monitors their learning and progress.

The pandemic brought about a number of challenges for all aspects of education: learning, teaching and assessment. Very quickly, teachers and learners became competent using video conferencing to deliver education and while there were notable advantages, it is now clear virtual contact cannot replace core face-to-face activities which allow educators to deliver effective teaching and robustly assess learners against learning outcomes. Monitoring and recording the progress of a dental student was critical throughout the COVID-19 pandemic, as well as now as we emerge in the recovery phase, trying to get our dental students to comparable levels of clinical experience compared to pre-pandemic cohorts. Birmingham uses the online recording system – Clinical Assessment and Feedback System – which has had targeted development and enhancement, taking into account the needs of the learners, educators, the institution and the professional regulators during this time and going forward.

On the horizon, we are acutely aware of the continuing widespread engagement of digital scanning technologies and the need to ensure the future workforce are prepared to use these systems, while being competent at undertaking traditional and analogue

techniques that underpin the modern systems. Time is our biggest challenge and putting together a curriculum that delivers all within a five-year degree programme is becoming increasingly unfeasible. Our greatest ability as dental professionals is to be adaptable and the future will bring plenty of opportunity for us to demonstrate this.

Thomas Addison: perception of academia in the development of dental education

A student's experience in undergraduate education is the start of a career of lifelong learning. As academics, it is our role to ensure they graduate as safe beginners, equipping them with the tools to develop skills and make future career choices. Graduates leaving dental schools in the UK almost exclusively enter foundation training, with these schemes proving highly successful in bridging the gap to general practice. The development opportunities for the graduate are enhanced during this year by a trainer, who can embrace the prior teaching from dental school, as well as develop the practitioner from their own interests and skills. Following this year in practice, hospital positions or a training pathway then dictate the career path for many, and for the rest, a career in general practice follows.

As a research-intensive university, research underpins the curriculum, being pivotal in providing students with a critical approach to clinical practice. The current educational strategy builds on this, with the undergraduate curriculum being supported by evidence-based dentistry; however, there can be a perception that this approach can become a barrier to embracing change when looking to introduce new technology and techniques when developing the curriculum.

For all of the difficulties during the COVID-19 pandemic, there has also been a positive effect on dental education. The challenges of the pandemic have been an opportunity to change established perceptions; innovate; change practice and processes; ensure assessment is authentic and appropriate; and listen much more attentively to the needs of our students. It is clear from these discussions that we need to continue to educate ourselves as academics in order to equip this generation of students with the skills required for the challenges of their future. Resilience is one of these areas. We had embraced resilience training for students

before the pandemic; however, its value has since become increasingly apparent.

The last two years have been difficult; however, academics now have a much wider skill set and tools available to them as educators, especially in digital technologies. This pace of change would likely not have happened without the pandemic. For our educators, there is further recognition of the importance of education in career development for all staff. There is also considerable opportunity to narrow the gap between dental school teaching and dental practice and reward those practitioners who want to follow a career in education, as well as maintain successful practices. We have a significant number of general practitioners working as clinical tutors, underpinning delivery of clinical education, supporting full-time staff and enhancing the education of our students by bringing their skills, knowledge and experience into undergraduate training.

Will Palin: the perception of research in dental education

Teaching is a creative practice and research within higher education should play a significant role in fostering innovative delivery of education. Research-driven education is the cornerstone of an impactful undergraduate education and life-long learning. The development of research skills within a clinical environment is not only critical for those that seek an academic career, but also for building life skills, through inquiry, critique and to adopt best practice, ultimately for the benefit of patient wellbeing. Although direct instruction and delivery of factual content is necessary for some aspects of dental undergraduate education, it is the inquiry-based and student-focused learning environments that will provide opportunities for critical appraisal, research skills development and to understand what and how evidence can be used for best practice.

For professional and vocational training pathways, such as dentistry, nursing, hygiene and therapy and other allied subjects, an ethos of student-focused creative design of education and essential practical skills should integrate within all dental school curricula. Dental institutions within the UK are also fortunate to employ many of the world's leading researchers in their respective fields, both clinical academics and basic scientists, that translate their expertise and knowledge within dentistry and wider biomedical fields.

Rigorous educational programmes are supported by their ground-breaking research, which encourages inquiry, critique and the importance of research and innovation, inspiring the next generation of academics, or at least providing the basic skills essential for continued professional development. Many curricula include opportunity for research training and evidence-based learning, including 'wet' lab training and proper literature review, either through elective schemes or specific study modules. However, there are several current and future threats that have or may continue to hamper research activity and innovation and that will ultimately detract the delivery of creative teaching design and how research and evidence-based learning can be instilled within.

Since the beginning of the COVID-19 pandemic, the translation of teaching delivery to effective online platforms and the array of functionality that these offer have provided students with greater flexibility and methods of learning. Although the return to face-to-face education has not come soon enough, many aspects of innovative virtual learning environments will be taken forward to provide a stimulating, interactive and complementary education for both teaching and research-related activity.

Notwithstanding the effects of the pandemic on research and teaching, there exists increasing pressures on existing dental curricula, such as the reduction of 'practical classes' and elective period studies, that often include hands-on experience in research laboratories and the design and execution of experiments. Dental schools should actively encourage and empower staff to emphasise the importance of research, not only within day-to-day lectures and tutorials, but in direct involvement with relevant activities, for example, local and national student groups that facilitate exposure to research activity, student-active research projects, journal clubs, attendance at regular seminars by research experts, attendance at relevant conferences, etc.

There are several examples of students with an active research experience in UK dental education, such as postgraduate entrants with a basic science background and a minority that intercalate during the dental degree itself. However, this may not necessarily relate or integrate within a dental education setting and does not provide relevant experience for everyone. At the very least, dental-related undergraduate programmes should

teach practicalities of the research process: literature searching; review and critical appraisal; data collection; and analysis. Ideally, all undergraduate students should have the opportunity to actively engage in research and there are several examples of dental curricula outside the UK that include a mandatory requirement of a research thesis for successful graduation in dentistry.

Cultivating a deep approach to learning through research focus and experience is essential for every student studying towards a dental-related degree to promote inquiring minds and provide a foundation necessary for professional development. Its integration must always remain at the forefront for the development of UK dental education.

Conclusion

In summary, dentistry has come a long way in Birmingham since 1881, both in terms of education and research developments. Dentistry can be proud of its contribution to the widening participation agenda. Our greatest ability as dental professionals is to be adaptable and the future will bring plenty of opportunity for us to demonstrate this. We have seen how resilient dentistry has been over the COVID-19 pandemic, both in terms of education and research; the next 150 years will be a very exciting time to work in the field.

Ethics declaration

The authors declare no conflicts of interest.

Author contributions

Upen Patel, Iain Chapple, Jo Batt, William M. Palin and Thomas Addison have contributed to one of the sections in the paper as highlighted in the body of the paper. Kirsty Hill acted as overall editor and completed the introduction, conclusion and abstract.

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