

Blended learning and an exploration of student expectations on a Master's prosthodontics programme with reassessment at five years

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Key points

Suggests that blended learning effectively delivers postgraduate prosthodontic education.

Shows that satisfaction levels are high especially following graduation.

Highlights that students should be aware of the need for good time-management and self-motivation.

Aims To explore student expectations of a blended learning Master's programme in dentistry, evaluate whether the programme is meeting learner expectations and re-evaluate at a five year follow-up. **Materials and methods** A quantitative questionnaire was developed for an online survey of all new and current students as well as graduates from the past three years of the blended learning Master of clinical dentistry degree in fixed and removable prosthodontics at King's College London. A total of 124 surveys were emailed. Statistical analyses tested for differences between the groups and for differences within the groups. Five years later a re-evaluation was performed to assess changes. **Results** Initial response rates were: 69% for new students, 81% for current students and 66% for graduates. The majority of respondents expressed that the programme was meeting their expectations: 94% new students, 87% current students and 100% of graduates reported satisfaction. Over 90% of respondents agreed that they gained academic, clinical and career benefits through the programme. Most respondents agreed that blended learning enabled them to study effectively at a distance while maintaining other commitments. Difficulties identified were: time management, rigorous demands of the course, perceived feelings of isolation and insufficient feedback. Programme changes were implemented and the five year follow-up showed increased satisfaction levels at 92% and 96% for new and current students. **Conclusions** Interpretation of the data supports the application of blended learning and demonstrates that this blended Master's programme in prosthodontics provides a positive and meaningful learning experience for students. The learner view is essential for continued course evaluation and enhancement. Measures brought in to address recorded concerns have been effective. An evaluation of the challenges has led to improvements in the course content and delivery.

Introduction

Advances in technology have impacted society on a global level. From smart phones to Google to Facebook, the digital revolution continues to transform the way we live, communicate and socialise. Inevitably, the use of technology

is pervading higher education, compelling educators to challenge existing concepts and assumptions of teaching and learning in universities.¹ Leaders of higher education (HE) progressively endeavour to position their institutions to meet the connectivity demands of prospective students, often described as the 'Google/net generation', and their growing expectations for higher quality learning experiences and outcomes.¹ Students in HE today can be described as 'digital natives' rather than 'digital immigrants' using ICT daily and seamlessly for studies, social interaction and recreation.^{2,3}

While face-to-face scenarios can offer a student-focused, non-didactic approach, e-learning models present further possibilities. As early as 2001, it was identified that

universities would need to 'provide for a larger and more diverse cross-section of the population, to cater for emerging patterns on educational involvement which facilitate lifelong learning and to include technology based practices in the curriculum'.⁴ This view was reinforced in a vision of the future of higher education (HE) in the UK.⁵ Potential new markets in education were predicted, such as the ageing population and increased demand for continuing education in the workplace in response to UK Government focus on continually maintaining a skilled workforce. Technology may help to meet these changing demands in future education provision. The emergence of the University of Phoenix as a no campus, online digital university is considered

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as one end of the e-learning spectrum.⁵ Online private education is increasingly prevalent and e-learning is becoming very much 'core' strategy for many HE institutions, for example, Curtin University (Australia).

Another initiative is the use of MOOCs (massive open online courses) to enable the HE institutions to provide open education to large groups of learners. Beginning in 2008 and gaining momentum in the US through Coursera this has challenged access to HE currently seen as in the domain of the universities. While free online learning through MOOCs has escalated on a large scale, there are many challenges for this kind of learning, not least poor completion rates, limited pedagogic underpinning and for the university providers it is resource intensive without clear and evidenced benefits gains. While undoubtedly a marketing tool for universities who can display their courses and talents it may downgrade real meaningful learning and academic pursuit to the level of 'edutainment'.

Laurillard^{6,7} commented that: 'Education is in an interesting phase between its ICT-free past and its ICT-aware future' and the *Times Higher Education*, commented about MOOCs that 'Education is not a mass customer industry: it is a personal client industry'⁷ – and thereby lies one of the main challenges for blended/online learning. Blended learning recognises some combination of physical and virtual environments but the term has also been criticised as being inconsistent and ill-defined, and has been questioned in its conceptual integrity, arguing that the 'blending' in this context is essentially not about learning, but rather about teaching.⁸

Garrison & Kanuka¹ view blended learning as both simple and complex. Its complexity lies with 'the challenge of virtually limitless design possibilities and applicability to so many contexts'. Pedagogical challenges arise for course designers and learning facilitators in catering for differences in learning styles and preferences between learners. Furthermore, they observe that advances in knowledge regarding individual differences in cognitive style and innovations in technology impacting instructional design have developed largely in isolation of each other. At a simple level, blended learning can be described as 'thoughtfully integrating face-to-face and online learning, fundamentally rethinking the course design to optimise student engagement'.⁹

In the UK, the HEFCE Strategies for e-learning supports the prevalence of face-to-face

teaching blended with e-learning.^{10,11} This has been the policy in developing and implementing the blended Master's programmes offered by the Dental Institute at King's College London over the past decade, which this study has focused on. Running an intensive training programme in such a practical subject is a robust test of the capabilities of blended learning and will demonstrate its weaknesses in this study.

Blending enables greater flexibility in learning and attempts to place the learner at the centre of education rather than the teacher.¹² However, the laudable aspirations of blended learning in promoting a learner-centred approach through time, place and pace of delivery, may be somewhat undermined if differences in individual learner styles, preferences and strategies are not considered.¹³ Beetham *et al.*¹⁴ highlighted that 'many learners lack general critical and research skills: "digital scholarship" is poorly communicated and modelled in many subject contexts'. Diversity of the student population adds further complexity to the concept.

Ellis & Goodyear¹⁵ assert that students are keen for a good balance between face-to-face (F2F) and technology-mediated activities. Blending text-based asynchronous and synchronous internet technology with face-to-face learning enables some of the conveniences of fully online courses without the complete loss of face-to-face contact. There is emerging evidence that blended learning is more efficient and effective than the traditional classroom model with international comparative studies reporting enhanced student achievement and increased satisfaction in blended scenarios compared to traditional face-to-face delivery.^{16,17}

Reviews of the literature essentially agree that there is a paucity of research relating to the student experience of e-learning.^{14,18} Where the student experience is explored, findings are often contradictory to the teacher perspective.¹⁹ This paper seeks to understand more about intensive Master's level blended learning student experience.

This study focused on the Master in Clinical Dentistry in Fixed and Removable Prosthodontics (FRP) degree offered by King's College London (KCL) through blended learning. This particular programme was selected for the study because it is well established, having large numbers of currently enrolled students as well as past graduates. This pioneering online Master's programme in clinical dentistry has a credit value UK360/ECT180 at credit level 7. The four-year blended

programme is aimed at dental practitioners wishing to enhance knowledge of prosthodontics for general practice and attracts students across the UK and globally. Students are able to access course materials and resources and submit assignments online, anytime, anywhere, through a customised virtual learning environment (VLE). Asynchronous and synchronous interaction with other students and tutors is encouraged through a discussion board, chat room and webinars. Participants attend a compulsory intensive nine-day block face-to-face component in years 1–3 involving hands-on clinical training, laboratory work, seminars and tutorials.

This study aimed to explore whether the blended learning Master's in clinical dentistry (FRP) programme is meeting student expectations and to gain an insight of the learner perspective.

Method

A quantitative questionnaire was developed for the purposes of this study (supplementary online only questionnaire). The questions were designed to seek student perceptions of their experiences, expectations and levels of satisfaction of the FRP programme. The anonymous feedback questionnaire was part of a routine service evaluation which does not require ethical approval. Three different groups were included in the survey: first year students, other student year groups and graduates. The rationale was to enable some longitudinal perspective over the duration of the four-year programme. Graduates of the past three years only were sampled rather than all graduates of the programme. The course has changed substantially over the last decade; the learner experience of students graduating pre-2008 would not be comparable with the current course.

The first section of the questionnaire collected demographic data for respondents, such as gender, employment, UK/non-UK based. To preserve anonymity, respondents were not required to submit identification details such as name or date of birth, at any stage during the survey process.

Part 1 of the survey requested participants to respond to questions using a five-point Likert scale marked 'strongly agree', 'agree', 'neither agree or disagree', 'disagree', 'strongly disagree' and 'not applicable'.

Part 2 requested yes or no responses to questions posed and gave participants the opportunity to offer free comments.

The questionnaire was the same for each of the three groups in the survey, to allow comparisons to be made. The questionnaires differed only in the grammatical tense used in posing the questions:

- For the new students the questions were posed prospectively
- For current students the questions were posed in the present tense
- For graduates the questions were posed retrospectively.

The time period for collecting responses was one month. Data were recorded and stored electronically using Survey Monkey. Participants were advised that the survey was optional and they were not obligated in any way to respond. No incentives were offered for completing the questionnaires.

The Kruskal-Wallis test was applied for non-parametric comparison of the three independent groups. Fisher's Exact Test was applied to analyse the categorical data. Pair-wise comparisons were performed for each statistically significant result, applying Bonferroni correction. Differences within each group correlating to variables of gender, age and UK/non-UK based students were investigated by conducting further tests, Fisher's exact test and Pearson's correlation coefficient.

A re-evaluation was carried out five years later to assess any changes.

Results

Response rates were high (38 graduates, 57 current students mid-programme and 29 new students). Interestingly, the response rates of 66% for the graduates' survey and 67% for the new students' survey were lower than for the current students (81%).

The demographic data showed that the majority of respondents across all three groups are male, based in the UK and work in general dental practice. The number of female respondents was considerably lower than male respondents: 35% for new students, 38.8% for current students and only 16% for the graduates' survey.

Most respondents across all three groups were employed in general dental practice (63.2% new students, 83.3% current students, 80% graduates).

The age profile of respondents showed that most are in the 30–39 years or 40–49 years age groups (75% new students, 78.7% current students, 88% graduates).

The majority of respondents expressed that the programme is meeting their expectations: 94% new students, 87% current students and 100% of graduates reported satisfaction.

Following the audit, changes were made to the programme, informed by the feedback provided and the five-year audit showed that the satisfaction level remained high for new students at 92% and increased to 96% for current students.

Discussion

The response rates were deemed good and the lower response rates for graduates and new students may be because established students currently enrolled on the programme are more engaged in the course than the other sample groups and therefore more likely to participate in the survey, yielding a higher response rate. Benefits of the blended learning approach were recognised, for example:

'Excellent course content, ability to continue to work full time and complete course due to distance learning format' (new student)

'More confidence in my clinical work than expected also the job opportunities' (current student)

'McLindent offers the highest qualification and greatest options for the future, the distance learning and single residential is ideal for someone in practice outside London' (current student).

However, the negative aspects of studying at a distance were commented on:

'Teachers are not constantly in touch with students' (new student)

'Greater time commitment required than I had anticipated' (current student).

The ratio of male to female students on this programme is not representative of the proportion of females in undergraduate dental cohorts in the UK or of the dental profession overall. Further analysis of the data revealed that the actual proportions of females in each sample were as follows: 31% for new students; 42% for current students; 34% for graduates. This shows that fewer females enrol on the FRP programme than males. Again, this is not consistent with the UK dental profession or reflective of undergraduate dental cohorts in the UK that usually have 50% or more females. The long, comprehensive, clinically technical FRP programme seems to attract a greater number of male dentists.

Most students were in general dental practice which suggests that the course content and structure is of interest and is relevant for dentists working as general practitioners.

The age profile of students infers that the programme appeals to established, experienced professionals who are likely to have work and/or family commitments and require the flexibility of mainly online course delivery. Such individuals may be inclined to study independently and less likely to participate in optional collaborative and interactive online discourse due to time constraints and busy schedules.

In terms of the programme itself, an overwhelming majority of respondents expressed that the programme is meeting their expectations: 94% new students, 87% current students and 100% of graduates reported satisfaction. The 100% satisfaction rate of graduates is particularly remarkable and 100% of graduate respondents would recommend this programme to others. Example of comments:

'Starting the course was best decision I have ever made and has made such a difference to both my practice of dentistry and self-fulfillment, I cannot start to thank the team' (FRP graduate).

The satisfaction response was slightly lower for current students (87%) compared to graduates (100%) and new students (94%). This is perhaps unsurprising as the long duration (four years) and rigorous demands of the course are likely to challenge student motivation and positive attitudes as they progress through the pressurised programme of study. This theme is illustrated in the free comments such as:

'Much more demanding than expected' (current student)

'It's a challenging programme' (current student)

'It gets a bit monotonous doing assignments non-stop' (new student).

On course completion and reflection, graduates appear to appreciate and value the programme, reporting 100% satisfaction and indicated by many positive comments:

'Exceeded my expectations. Technology has allowed the programme to deliver a level of education I previously only believed could be attained through a taught/face-to-face programme' (FRP graduate).

New students demonstrated a high level of satisfaction; however free comments such as, *'Not sure. It's only been 5 months since the start'* (new student), show the limited experience of the programme and mode of study by new students.

Differences between the groups

Statistical analyses identified some differences between the groups. There were no significant differences associated with gender in the new students' and current students' groups. For the graduates group, more males reported unexpected gains from the course. There were no significant differences correlating to age within the new students' group.

The ICT skills required do not seem to deter more mature students from enrolling on the programme. Jeffries²⁰ observed that use of technology for learning is not related to age and prior experience.

For current students, gaining greater job satisfaction while studying for this Master's programme positively correlated with age. Perhaps the programme has a greater impact in the workplace for more experienced dentists. In the graduates' group, accessibility and navigation of the VLE and perceived usefulness of online resources negatively correlated with age. This may be because the VLE was less sophisticated when these respondents were enrolled on the course. This result may also reflect that more mature students engage less effectively with technological aspects of the course.

Satisfaction with the quality of teaching and the value of the face-to-face components negatively correlated with age within the graduates' survey. The reasons for this may be that older respondents experienced the course before more recent enhancements to the face to face and teaching elements. However it may be that older, more clinically experienced dentists gain less from these aspects of the course.

Satisfaction with the administrative support negatively correlated with age in the graduates' group. This may again be related to older students experiencing the course prior to recent improvements in administration protocols, such as more efficient use of the VLE for transmissive and communication purposes.

There were no significant differences associated with UK-based and international students within the current students' and graduates' groups. The proportion of UK students was 65% in each category. For new students, more international students expressed a need for course improvement than UK-based students. Perhaps international students enrolling on the programme have higher initial expectations of the programme, though the reasons for this are difficult to ascertain. There is no difference in financial commitment between UK-based and international students.

These results must be interpreted with caution, as there were very few cases in the samples, limiting meaningful interpretation of the significance tests for differences within the three sample groups.

Learners' views

Mupinga *et al.*²¹ sought to identify expectations and needs of online learners and sampled 131 undergraduates enrolled on three web-based courses at Indiana State University. They reported the top three expectations of students as:

- Communicating with the professor
- Instructor feedback
- Sufficiently challenging course.

The main needs of online students were identified as:

- Technical support to access and navigate the VLE
- Considerate and flexible tutors
- Advance course information
- Sample assignments.

In JISC (formerly the Joint Information Systems Committee)-commissioned reviews of e-learning and blended learning in HE, a number of emergent themes that influence the student learning experience and level of satisfaction were identified.¹⁸

An objective of the present study was to gain a perspective of students' views of this prosthodontic Master's programme. This survey provided a worthwhile insight of the student experience relating to specific emergent themes:

Academic, clinical and career benefits

At least 90% of students across all groups agree that the programme enabled them to enhance their depth of knowledge and clinical skills, giving them increased confidence to manage complex clinical cases. The majority of respondents gained greater job satisfaction. It is clear that students embark on the programme with high expectations for career development; 100% of new students, 88.9% of current students and 81.8% of graduates expected the programme to enable career benefits and opportunities. The outcome for the graduates' survey is slightly lower than the optimistic initial expectations of new students, indicating that career aspirations may not be entirely fulfilled on course completion. Some characteristic comments from respondents:

'Increased confidence and varied career options' (FRP graduate)

'A much better overall ability to treatment plan effectively encompassing all aspects of dentistry, not just prosthodontics' (FRP graduate)

'I believe gaining the MClinDent qualification will offer many opportunities for future employment' (current student).

Studying at a distance

The vast majority of respondents (90% new students, 87.5% current students, 92% graduates) agreed or strongly agreed that studying at a distance enabled them to maintain work and/or family commitments. This is important as the survey responses showed that virtually all respondents are in employment, mostly in general dental practice. Free comments revealed that the ability to study remotely and flexibly was an important factor in selecting the course. These findings are consistent with others who reported that students with additional responsibilities often choose blended learning programmes for flexibility and convenience.^{20,22} Some typical free comments from respondents regarding this aspect are presented:

'Excellent course content, ability to continue to work full time and complete course due to distance learning format' (new student)

'Convenience of studying at home without missing on family and also monetary self supporting' (current student).

Graduates (92%) and respondents in years 2, 3 and 4 (87.3%) of the programme mostly agreed that studying at a distance was effective for their learning. New students were less positive (65%); perhaps this aspect is difficult to gauge at such an early stage in their programme of study. Alternatively, it may be that new skills are required for online learning and these take some time to develop.

Students expressed feelings of isolation and a desire for more face-to-face interaction. Paradoxically, most students acknowledge that the ability to study remotely was precisely the reason they had selected this programme. Nevertheless, a perceived sense of alienation was pervasive, often resulting in frustration for learners. This element is in keeping with the findings of Sharpe *et al.* in their reviews of e-learning and blended learning.¹⁸

Students also expressed a preference for more supervised clinical hands-on activities; again this is perhaps inconsistent with reasons for choosing a flexible blended learning programme that is mainly delivered online. Examples of typical free comments from respondents are:

'More residential courses so that there is interaction with tutors and other students' (current student)

'More contact with staff; quite isolated study' (current student).

Time management

Evidence suggests that time is a major concern for students engaged in e/blended learning and there appears to be a need for students to develop strategies for managing their time more effectively in blended scenarios.^{23–25} Many blended learning students are spouses, parents, and in employment with additional responsibilities and demands on their time. These students often choose blended learning programmes for flexibility and convenience, but time management is still challenging.²²

Research has identified that the busier the students' lives, the more likely they were to be highly organised in the use of their time.²⁰ Additionally, results indicated that as students progress in their learning and their use of ICT, they generally adopt more careful strategies for time management.

Allan²³ reported on experiences of 57 students on three different e-learning professional development courses.²³ Interviews, questionnaires and discussion group postings revealed that students were most anxious about time at the beginning of the course but reconstructed their approaches to time management early on in the course and went on to develop a range of different time management strategies that often required a change in their usual study patterns. Some students may find guidance and support helpful in acquiring and implementing strategies for planning their time effectively.

Cramphorn²⁵ used data from a discussion forum of 45 students reflecting on their experience of an online professional development course at Nottingham Trent University and observed that all students mentioned time, including: finding study time in busy schedules, physical writing time, time to reflect on posts and time lag in online discourse.

Time management consistently appeared as an important issue in this survey. Free comments highlighted that many students underestimate the demands of the course. Students expressed concerns regarding the heavy workload, particularly the number of assignments required. Students do appreciate that the programme is very comprehensive and thus demanding. A sufficiently challenging course was identified by Mupinga *et al.* as one

of the top three expectations of e-learners.²¹ Student comments demonstrating this include:

'Much more demanding than expected' (current student)

'I find it hard and it does not feel part time to me' (current student)

'It gets a bit monotonous doing assignments non-stop' (new student).

These perceptions are similar to time management issues reported in studies by the researchers mentioned above.^{20,23,25} It may be helpful to provide more support and guidance at an early stage to enable students to develop strategies for effective time management. Information from learning analytics can enable institutions to identify student engagement and patterns of study, and thus help learners to develop skills for managing their time.

Accessing and using the VLE

Current literature demonstrates that learners engaging in e-learning scenarios expect swift and easy access to online learning resources any time, any place.^{2,25,26} In this survey, new and current students expressed greater satisfaction concerning VLE access and navigation than graduates. This may be due to on-going improvements to the programme's VLE in recent years. All respondents stated lower levels of satisfaction concerning the effectiveness of online resources in supporting their learning compared with other aspects of course delivery. As a response to this, the VLE is now updated more frequently (three times per year) and a number of learning units have been updated or re-written.

The most unexpected results related to the optional online interactive components. Only 10% of new students, 26% of current students and 0% of graduates participating in this survey perceived that interactive components such as webinars, online interactive tutorials and discussion boards enhanced their learning experience. This is consistent with findings of other researchers who report that students engage poorly in online interaction, particularly in commenting on the work of other students and committing their views to a permanent written record.^{24,25,27} Some students are present as 'passive participants' in online interactive meetings. They are present, but not engaged with the learning activity. This growing phenomenon has been termed 'lurking'. Modern learning technology can make these lurking behaviours visible, so these lurking students are no longer 'invisible'. Student lurking

behaviours can be detected using a comprehensive monitoring system such as that available through the Learning Activity Managing System developed by Macquarie University.²⁸ They proposed that personalising online and blended learning experiences was not enough to maximise learning outcomes and concluded that learners should be 'held accountable for their learning'. However, it is important to recognise that learners have different learning styles and will engage in different ways with online activities and the VLE.

The online interactive components are not compulsory elements of the course; this may decrease student participation. Different time zones for international students may limit synchronous discussions. This could also be a reflection of the generation of the learners taking part in this study who may not be as comfortable with online communication as would be the younger generations more used to living their lives in social online environments.

Interestingly, although satisfaction with online interactive components was low, students expressed a desire for meaningful online discourse. Some students commented on the poor quality of mega-meetings, which are web-based synchronous meetings designed for online seminars and group interaction learning activities:

'More mega meeting time from a wider range of subject teachers' (new student)

'The weakest aspect was the lack of online resource which appears to have been completely updated and is now excellent' (FRP graduate).

This feedback has led to a change in the platform utilised for online seminars. 'Webex' is now employed and has improved the quality of such meetings. Online seminars and group activities have been increased for all year groups following analysis of the quantitative data and student free comments.

Impact of tutors

The importance of the tutor is well documented in the literature and the results of this study are in line with current research.^{16,29–31} Most students agreed or strongly agreed that the quality of teaching is of a high standard (89.4% new students, 95.8% current students, 100% graduates) and satisfaction with teaching quality increased as students progressed through the course and experienced more input from the tutors.

Many students expressed appreciation and gratitude for the teaching team, describing tutors as 'inspirational', 'knowledgeable',

‘enthusiastic’ and ‘approachable’. There was a desire for more face-to-face time involving tutors. Students greatly value tutor feedback, encouragement and communication. This is consistent with the findings of others where the tutor was identified as fundamental for course satisfaction and learning achievement among e-learners.¹⁶ The importance of tutors being flexible and aware of the needs and expectations of e-learners has been highlighted as vital for a positive learning outcome.²¹ This element was reflected in free comments in this survey:

‘The staff are brilliant, co-operative and understanding and I will make the most out of this program’ (new student)

‘I am very thankful for my tutors and admins for being very helpful and cooperative and very satisfied and grateful for the experience I gained’ (current student).

Feedback

Students appear to place great emphasis on feedback from tutors and ‘instructor feedback’ is a principle expectation of e-learners.²¹ The survey findings confirmed this. Satisfaction level of students from all three groups concerning feedback was less positive than for other aspects: only 30% of new students, 23% of current students and 20% of graduates strongly agreed that feedback on their work was helpful and facilitated their learning. This is directly in line with findings in the UK from the National Students Survey (NSS) and Postgraduate Taught Experience Survey (PTES), which consistently identify assessment feedback as an on-going issue for the sector as a whole, even in more traditional forms of delivery. The importance of feedback generated many comments from students in this survey. Examples are:

‘Feedback – I would prefer more feedback on essays and also some feedback on exams and an idea of how I am fairing in the year as a whole’ (current student)

‘Examples of essay plans along with the feedback are particularly useful’ (current student).

As a result, poor markers have been replaced and new systems to facilitate more speedy clinical feedback have been developed and implemented.

Unexpected learner gains

Survey participants were asked if they have gained anything from the programme that they had not anticipated. Themes included

a sense of community among students and social constructivism/collaborative learning in keeping with others that a strong sense of community promoted perceptions of satisfaction for learners in a blended environment.³² However, this theme is contrary to the data relating to student engagement and satisfaction with the online interactive components of the course. Students may perhaps prefer to form their own friendship/learning support groups to enhance their learning. Verbal feedback from year 2 students who formed their own study group reinforced this view. A selection of some free comments of interest includes:

‘A social network of like-minded dentists’ (current student)

‘Huge amount of learning directly from classmates’ (FRP graduate).

The notion of ‘communities of practice’ has been proposed where groups of people who share a common concern (or practice), interact and learn from each other.³² The ‘community’ indicates the social nature of learning, building on interaction and stimulated by mutual respect and trust, consistent with elements of the social constructivist theory.³³

Professionals increasingly expect learning to be engaging.³⁴ Cubric’s³⁵ prediction of the development of personal learning environments (PLEs) in future may facilitate the formation of informal learning communities by students according to their needs and preferences rather than through prescription by course tutors. Personalised learning environments can be described as tailoring education to current situation, characteristics and requirements of the learner, with the aim of optimising the learning experience and outcome.³⁶

This is distinct from ‘customisation’ where the learner simply has the option of adapting certain features of the VLE to suit their personal preferences. Customisation may be realistically achievable for institutions, giving the learner some ownership of their virtual learning space. With the vast amounts of educational data now generated by online learning systems, it has been proposed that developing algorithms for personalising environments as the ‘grand challenge’ for educational technology and learning analytics, including the implementation of a semi-automated model, including machine-learning algorithms (MLAs) that are continually shaped by human actions, to deliver true ‘personalisation at scale’ by educational institutions.³⁷ Further research

and analysis is required to evaluate the value of this approach.

Another positive gain from the course that students stated was the acquisition of further technological skills. One negative aspect that respondents expressed was concern regarding the costs incurred for the programme of study. Financial implications are likely to become increasingly important as the recent introduction of undergraduate tuition fees in HE in the UK may well impact on the uptake of postgraduate education in the future.

Conclusions

Analysis, interpretation and exploration of the data demonstrate that this blended Master’s programme in dentistry provides an educationally robust and meaningful learning experience for students. The programme is rigorous, challenging, comprehensive and relevant to general dental practice, attracting established and experienced professionals from across the UK and globally. The use of technology to deliver a flexible, accessible blended course enables busy dentists to study online and attend face-to-face components while maintaining work, family and/or other commitments. High levels of learner satisfaction were expressed, though there are areas that can be enhanced further. Overall the results support this application of blended learning to the discipline of dentistry.

Blended learning pedagogy and course design is often based on social constructivism and collaboration. Strategies to engage students more effectively in online interaction would enrich the course further. Approaches such as allocation of a personal tutor/mentor may help to reduce feelings of isolation, alienation and frustration perceived by some students when studying at a distance. This strategy was implemented as a pilot for the 2015 student cohort.

This study has provided valuable insights regarding the student experience of a blended Master’s programme. However, the sample sizes in the survey were relatively small, though the response rates were high. Ideally, the same cohort would be monitored through their programme of study, from enrolment to graduation, to gain a longitudinal perspective. Time constraints did not allow for this, therefore, three separate groups were surveyed. While this provided a useful snapshot of the data, a longitudinal survey would be beneficial. Action research such as documenting the individual student journey through the use of reflective diaries may provide helpful

qualitative data of the learner experience of a blended programme.

The learner perspective is an essential element of course evaluation, enhancement and evolution to ensure students' expectations are continually met for a positive, meaningful and successful educational experience. Learner feedback from the initial audit informed implementation of changes and improvements to this prosthodontics programme, leading to enhanced student satisfaction at the five-year reassessment.

This questionnaire-based survey could be adapted and applied to other blended learning scenarios in higher education. Recent advances in 'big data' and learning analytics can be employed by HE institutions to personalise and further enhance the student experience, provided there is clarity of vision in how such information is used.

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