



Transforming Assessment In Higher Education

A Case Study Series

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Case Study 12

Exploring active learning approaches to increasing student engagement through assessment and feedback

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Background

Learning about the detailed structure of teeth (dental anatomy or tooth morphology) is a fundamental part of any undergraduate (UG) dental course. Traditionally teaching of this topic has been primarily through lectures supported by practical teaching largely based upon observation; an essentially passive approach to learning. Teaching of tooth morphology is predominantly delivered in the first two years of dental (BDS) or Oral and Dental Health Sciences (BSc/ODHS) programmes. For safe and effective clinical practice, knowledge of tooth morphology has to be retained throughout clinical training and beyond into practice. Therefore, there is a need for students and demand from staff that this knowledge is delivered early in the course in such ways as to foster deep learning (Hattie, 2012). At the same time the General Dental Council (GDC) have a requirement that dental curricula promote active reflection in student learning and student engagement in assessment and feedback (General Dental Council, 2015-<https://www.gdc-uk.org/professionals/education>).

Approach

In an attempt to foster further the student interest in the subject content and to increase engagement through assessment and feedback, an active learning approach has been developed using the principles outlined in transforming assessment in HE (HEA, 2014) to support more reflective learning and supporting students own meaning-making. Through a workshop approach that aligned learning with formative assessment we aimed to develop an approach that promoted assessment for learning (Hattie and Timperley, 2007). We achieved this through a combination of self- and peer-assessment and feedback. In this workshop students were taught three-dimensional tooth morphology through carving teeth from soap. This was followed by a formative assessment and feedback process. The assessment used a combination of self-evaluation, peer review, and staff assessment of the carved teeth. A grading matrix was developed designed to assess the accuracy of the carving by measuring key dimensions of the model and looking for the presence or absence of key features that identified the tooth. By requiring the students to focus upon the accuracy of their work and the work of others the grading matrix enhanced the learning of the topic through a formative assessment for learning approach while supporting active reflection. The School-wide workshop was run once with 35 undergraduate students; from all stages of our two programmes (BDS and BSc/ODHS). Eight trained staff (2 Clinicians, 2 Dental technicians, 4 postgraduate students PGTs from different stages) supported the workshop. Once students had completed carving their teeth, they were eager to start assessing their work to see how well they had done and to identify areas for improvement. Using the matrix they assessed measurements and features relevant to the tooth they were carving. This step was designed to consolidate the knowledge and skills they gained in this workshop and to promote their self-evaluation skills. Students then peer-assessed each other's work and gave written feedback; an exercise designed to reinforce both their understanding and for developing peer assessment skills. Students read the feedback and discussed it in pairs. A member of the teaching team also assessed the carved teeth and provided constructive and comprehensive expert feedback identifying areas for improvement.

Outcomes

Students were clearly enthusiastic and engaged about this method of learning tooth morphology. Results from a questionnaire distributed at the end of the workshop revealed that 100% of the students felt they had gained better understanding of tooth morphology, while 97% reported increased engagement in their learning of the subject. Comments from students helped us to understand the reasons behind their enthusiasm for this approach to learning tooth morphology:

"Interesting way to learn tooth morphology!" "Fun practical class!"

"I would love to do this again and practice more, also like to do more teeth (e.g. canine)"

"Good revision and easier to remember by doing, rather than looking in a book."

And the value the students placed upon the opportunities for self, peer and staff assessment as a means to promote learning:

"Opportunity to judge our tooth morphology and carved teeth"

"Will allow me assess my tooth build up for patients in the future."

"I know what features to look out for when doing tooth morphology more so now"

As the HE framework for Transforming Assessment (2014) identifies, developing self and peer assessment skills for students are fundamental ways to promote learning. Students participating in the workshop enjoyed being active participants directing their own learning by participating in an evaluation process during the workshop. They also recognised the value of this approach as a means to consolidate knowledge needed at later stages of their course as dentists or dental therapists where they need to self-evaluate the tooth when repairing damaged teeth or assessing the quality of ready-made crowns.

Staff had been trained prior to this carving workshop on how to carve teeth and assess carved teeth and also reported that they had learnt as the result of their teaching.

Comments from staff included: "This was an opportunity for us to identify how the assessment process successfully deepened understanding of tooth morphology and made learning more enjoyable." "I found this workshop to be very informative and enjoyable especially assessment part which helps us assessing our work, thinking of the geometrical dimensions of the carved teeth and identifying opportunities for improvement.", "It enhanced self-evaluation skills to a large extent". Quote from PGT student "I am pleased being able to successfully carve a tooth which greatly helps to transfer those skills in clinics, when treating patients (e.g. composite build ups)".

Why is this approach so apparently powerful in supporting learning? There is evidence from the teaching of gross anatomy (Pather, 2015) that requiring students to study human cadavers promotes active learning through engaging students in an active process of observing structures in detail and is promoted by a process called touch-mediated perception (Smith and Mathias, 2011). We cannot get students to dissect but would argue that the process of carving teeth, measuring the dimensions and observing

the features carefully through asking them to assess their work promotes deep learning (as defined by Marton and Saljo, 1976) by similar processes.

The impact of the workshop can be evidenced in its internal dissemination in a Learning and Teaching Forum in the Faculty. Staff in other Schools in the University (School of Medical Education, School of Computing Science and School of Biosciences) involving the teaching of biological structure have shown considerable interest in applying these methods. Following this success, a proposal has been approved to add this activity to the Newcastle Dental School curriculum. The adaptation of a new way of teaching tooth represents an example of students co-creating course content (HEA, 2014). It has been the active engagement of the students in this method of teaching that has helped its adoption into the curriculum.

The next step will be to share good practice and demonstrating the generalisability of this method of teaching tooth morphology by running this workshop in partner Dental Schools in UK and to disseminate the outcomes in conferences and publications. This will support the development of a stronger evidence base to encourage wider uptake of this approach. The final step in this work is to involve a long term evaluation of the effectiveness of learning tooth morphology by this method by looking at knowledge retention by BDS and BSc/ODHS students in later stages of their courses.

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