

## Intelligent Anatomy

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**Subject Area:** Human Anatomy; Learning Styles

This case study has been developed from data gathered through observations of the teaching component, interviews with the tutor, student questionnaires, and a student focus group with students from the current and previous cohort.

### Background

'Anatomy of the Human Body' is a 10-credit, 12 week module for 2nd year BSc Biomedical Science students at the University of Sheffield. The current cohort is 180 students. This core module aims to give students a holistic understanding of human anatomy and to develop their ability to relate anatomical structure with function. Students are encouraged and supported to identify their preferred learning style(s) and all module components are designed to expose students to a wide range of learning and teaching strategies. For example, in addition to the more traditional and linguistic modes of teaching such as verbal explanation of concepts and text-based presentations, students create 2D or 3D models of anatomical structures using paper or pipe-cleaners; in lectures they use face paints to draw muscles on the forearm and hand of their peers, participate in a class modelling of the rotation of the gut, and an 'aerobics' session to music to demonstrate the actions of the lower limb muscles.

Through weekly interactive lectures and human dissection students study the anatomy of the thorax, arms, legs, abdomen and pelvis. Each lecture contextualises the anatomy to be studied in the following practical. Students attend 1 of 4 dissection classes and work in small groups to a human cadaver; each group being supported by a demonstrator and the tutor. The module is well supported by multimedia resources accessed through the VLE, including video clips and podcasts, formative quizzes, glossaries, animations and models, and lecture slides. The course is structured around two handbooks, arranged by topic, which outline explicitly, tasks the students must complete by accessing the online resources, by private study and attending timetabled classes. Students are summatively assessed via two online MCQ quizzes and an anatomical 'spotter' test, which evaluates their ability to identify anatomical structures.

### Reasons for introducing this teaching method

Traditional teaching and learning of anatomy is through human dissection and heavily favours rote learning of long anatomical terms, which "*makes much of the material inaccessible to students who are not linguistic learners and encourages superficial assimilation of facts*". The incorporation of different learning styles across the module was a considered strategy designed to address the needs of a large and diverse group of students (over the last 5 years the cohort has increased from 80 to 180). Exposure to a wide range of learning strategies was designed to enable all students to develop a deep conceptual understanding of gross human anatomy and independent learning skills they could apply to other modules and learning.

### Lecturer perspective

Having struggled to learn anatomy herself, the tutor has sought for more than 6 years to determine the most effective ways of teaching the subject. Through time as a secondary school teacher, MEd studies and review of the literature she is aware of the positive impacts facilitating students to learn in their preferred 'style' (Gardener, 1991) can have on academic achievement and students' ability to learn independently. She was strongly motivated to create an inclusive curriculum, which would make learning about anatomy, an intellectually and technically difficult subject, accessible for all students. In her experience students find human anatomy fundamentally interesting but may struggle to marry the theory with the reality they observe. Successful mastery requires students to understand and translate Latin and Greek terminology to correctly explain the scientific concepts and this can be challenging, particularly for students whose first language isn't English or those with dyslexia; strategies such as the provision of glossaries are designed to overcome such difficulties. The tutor finds the approach "*keeps her thinking*" and "*challenged to try different methods*", and "*following this experience students hit the ground running in subsequent anatomy modules*".

## Student perspective

In the 139 returned questionnaires students strongly agreed they had increased their knowledge and understanding of anatomy and were able to relate structure and function (93/139) and a large number identified they had also developed "dissection" (87/139) and "study skills" (66/139); for example one student commented "[it has] taught me how to transfer my learning to the UK". Twenty percent (28/139) of students said they had developed "independent learning" skills; "teaches you how to learn not just teaches you". Over 80% (116/139) of students strongly agreed or agreed the lectures were highly effective. The electronic support materials (95/139) and module handbooks (63/139) were also identified as very useful by students.

The focus group involved 10 students drawn from the current and 07/08 cohort, who universally identified the tutor as approachable "you can ask exactly the questions you want to ask", enthusiastic and "passionate about anatomy". This enthusiasm was said to be infectious and highly motivating for students: "she goes the extra mile and it motivates you to learn", "you want to do it". Her approach was identified as distinct: "the lectures aren't based in the same way other lectures are, a lot of it is stand up, this is a muscle, this is how that works". The wide variety of styles of materials and activities was highly valued "it's a combination of everything" "I particularly liked having lots of kinaesthetic tasks such as using pipe cleaners to model the brachial plexus..really helped consolidate and clarify complex concepts", and this was said to "revolutionise how you learn [and make a] potentially hard subject [possible to] learn in manageable chunks".

## Issues

Students felt challenged by the pace of the module and the volume of learning and some would have liked more lectures and dissection time. This is perhaps not surprising given the module is students' first experience of anatomy and involves a "journey of self-discovery in the dissection room [and it] takes a few weeks for students to adapt to this". The quality of demonstrators was viewed as variable; "some are really good", but this was less of an issue as "they rotate on a weekly basis". A small number of students would have liked to have been in smaller groups for dissection or expressed a wish for "more cadavers".

## Benefits

Students greatly appreciate the variety of approaches and the encouragement to learn "in the way that suits you", and stated this "revolutionises your learning" and had "been invaluable for all modules". "The lectures and online material complement each other" and as intended "prepared [them] for the practical". The tutor's use of lots of examples "makes it so much more interesting" and the use of mnemonics and music was also successful. In the focus group and questionnaires students articulated their increased knowledge and a depth of understanding of anatomy and a move to more independent learning, of having shifted learning strategy away from rote and surface learning towards a deeper conceptual understanding: "doesn't just teach you for the exam.. [but] to learn principles and understand things"; "teaching by principles rather than facts"; "learning the fundamentals". Students also mentioned "applying theory" and "content to other modules".

## Reflections

Students identified the module as intellectually challenging but enjoyable: "you're enjoying it all the way through; it made you want to go to lectures!". The multiple teaching and learning styles approach enabled them to understand how they learn and opened up new ways of learning "changes how you think about other lectures and teaching" and "through her separate ways of learning, completely altered the way I revise".

The interactive elements/activities need to be contextualised for students to engage and not feel patronised; one student commented "it kind of looks like primary school work but it's ok [and] really does help you learn." The use of interactive lectures and materials geared to different learning styles has also proven successful "for less visual topics such as endocrinology"; such approaches would readily transfer to other universities. Students are in no doubt "the benefits for students are huge".

## References

Gardner, H. (1991) *Intelligence in Seven Steps In Creating the Future: Perspectives on Educational Change*, Compiled and Edited by Dee Dickinson and available at [www.newhorizons.org/future/Creating\\_the\\_Future/crfut\\_gardner.html](http://www.newhorizons.org/future/Creating_the_Future/crfut_gardner.html)