**#7FF Posters: Anatomy and Surgery**

**Location:** Hall 6

**#7FF01 (480)**
Learning Anatomy through Art

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**Background:** Anatomy is fundamental to medical education and, traditionally, the main teaching method was Cadaveric Dissection. Although, it is still utilised worldwide, recently, some British schools have employed more novel approaches. This project explores the method of teaching medical students lower limb anatomy through sketching and art.

**Summary of Work:** Three sketching-anatomy classes were held at Peninsula Medical School. Students were given a short presentation on the anatomy covered and its clinical significance, before sketching the bones discussed in the lecture. Students were then tested on their knowledge and understanding. Feedback was gathered at the end of each session.

**Summary of Results:** Three voluntary sketching classes were held at Peninsula Medical School. There was a positive correlation between attending sketching classes and improvement in confidence of anatomy knowledge. No correlation was found between sketching ability and confidence. All of the students found the anatomy classes ‘very useful’.

**Discussion:** This project assessed student’s confidence of anatomical knowledge, which improved with sketching classes. Further work could explore the reasons contributing to this; nature of classes, more time studying subject etc. Additional work could evaluate the effect of art on student’s knowledge, for example through pre and post class anatomy questionnaires.

**Conclusion:** Anatomy knowledge can be considered the foundation for medical students to build their understanding of pathology and practice from. With some medical schools moving away from traditional dissection, alternative methods of learning anatomy are being considered. One such approach is through art, which through this project received overwhelmingly positive feedback.

**Take-home Message:** Alternative teaching methods to anatomy are being utilised in some British medical schools. Sketching classes, focusing on the bony structure of the lower limb anatomy with supplemental teaching and questions, provided an interactive and enjoyable method to improved students confidence in their anatomy knowledge.

**#7FF02 (1470)**
Anatomy E-Tutorial on the Arterial Supply of the Human Body

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Sarah Nichol, University of Glasgow, Glasgow, UK
Paul Rea, University of Glasgow, Glasgow, UK

**Background:** Innovations in modern technologies allow students access to educational resources in very different ways to traditional teaching methodologies. As such, and as part of a Student Selected Component, we created an e-tutorial on the arteries of the human body, linked into learning objectives of the Glasgow medical curriculum.

**Summary of Work:** An interactive e-tutorial on the arterial supply of the human body was created using Adobe Captivate 9. The e-tutorial details the arterial supply of the body in anatomical regions. Interactivity is incorporated as quizzes, clinical items, and detailed anatomy for early stage medical training.

**Summary of Results:** The e-tutorial was designed by students, for students as a pilot study. We shall present the ongoing evaluation from student users from pre-and post-evaluation surveys. The methodology of how to create an e-tutorial will also be discussed.

**Discussion:** The unique feature of this project is that the anatomical material is validated, and has involved students creating it for their peers. A constructivist approach has also been adopted, with students as co-creators of the educational and training materials, and enhances digital skills.

**Conclusion:** The interactivity of e-tutorials allows an alternative teaching and learning method to lectures, books and dissections. The e-tutorial can be used in places where accessibility, or use of traditional resources may be challenging. The resource is easy to use and tailored to target students.

**Take-home Message:** The e-tutorial created is a valuable teaching resource created for students, made accessible and user friendly for all. The resource can be used as both a teaching resource or a learning resource.
#7FF03 (61)
Digital anatomy at your fingertips: A bespoke touchscreen gateway for accessing digital anatomy resources at the dissection table

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Background: There is a wealth of digital learning resources available to students in human anatomy, including in-house teaching material and externally-sourced products. However, access to these is dispersed across multiple interfaces which can be a barrier to richly-integrated learning in the operational parameters of the dissection laboratory.

Summary of Work: This project created a web-based interface on iPad that compiles access to multifarious digital anatomy resources into one clear and secure gateway for use at the dissection table. Students access diverse collection of learning resources during dissection exercises, including the dissection workbook, lectures video explanations, and session notes.

Summary of Results: Using web code, a kiosk-style menu interface was created using a Flat Design approach. The design used simple elements, typography, and colours to provide a clear interface that aids physical touch navigation. Further, QR barcodes on specimen jars provided an instant link to a full pathology history on the device.

Discussion: The drive to provide technology-enhanced learning in dissection came from students asking to use their own mobile devices. A successful application for a local grant resulted in obtaining 10 iPads. The team met with student representatives to plan what would be delivered on the iPads.

Conclusion: In order to comply with best practice, the lab-dedicated iPads are restricted to display only the gateway interface and ‘white-listed’ websites. Additionally, anatomy has a large collection of pathology specimen pots labelled with a QR barcode, which are viewed with the iPad camera. Feedback was obtained via a paper poll.

Take-home Message: Having a bespoke iPad interface with access to a wide range of resources, makes learning more personalised to suit the learners needs.

#7FF04 (2647)
Photogrammetry as part of a multi-modal teaching model in anatomy education: a first year medical cohort perspective

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Alice Hyde, University of Liverpool, Liverpool, UK

Background: With increases in student numbers, changes in fees and an overhaul in the medical education curricula, higher education facilities are reviewing and reassessing their methods of anatomy teaching. Innovative approaches have been considered at the University of Liverpool, to identify effective and engaging ways to deliver anatomy education.

Summary of Work: Using ‘Aigsoft PhotoScan’ a 3-D ‘virtual prosection’ of a human heart was created. Following a practical anatomy session, a cohort of first year medical students (n=200) with no previous exposure to anatomy teaching or cadaveric material completed a questionnaire. Feedback encompassed opinion on virtual prosections, and considered their learning experience.

Summary of Results: Students were apprehensive about the cadaveric material, and felt they needed more assistance with real specimens compared to the virtual specimen. Feedback indicated the virtual prosections were of a high quality and offered sufficient anatomical detail and interaction to be used as part of an integrated teaching model.

Discussion: Virtual prosections can be produced, with detailed reconstruction of anatomical structures and a level of interaction that encourages more self-directed learning. Integration as part of a multi-modal approach to anatomy could ease pressures on time, as well as limited cadaveric specimens, without losing the 3-D aspect of anatomical learning.

Conclusion: Incorporating virtual prosections into anatomy teaching sessions for medical students could be beneficial to both staff and students, utilising limited time and facilities more effectively and providing an engaging and clinically relevant learning resource. Effectiveness of virtual prosections as a learning tool must be assessed, with more quantitative data required.

Take-home Message: Exploring innovative approaches to anatomy teaching is necessary to identify new methods of delivery for an increasing numbers of students, in a system which is under time and space-related pressure. Student perspective is essential in designing engaging and effective learning models and ensuring a positive student experience.
Innovative Peer-Learning Activity for Neuro-Anatomy in Cambodia

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Background: In Cambodia, resources are scarce and cadaveric materials are lacking. Didactic lectures are mainly used to teach anatomy. In addition, students are often required to learn a long list of anatomical structures, which may not be relevant or useful in their future clinical practice.

Summary of Work: We used interactive activity stations, around which students rotate in small groups to learn through labelling exercises, 3D visual aids and clinically relevant cases. We present data on student perception using a survey, and efficiency of learning using a paper-based assessment, of the innovative peer-learning activity in undergraduate medical students.

Summary of Results: All 143 students completed a 79 point MCQ assessment. The overall average pre-test score was 40 (51%), which improved to a post-test score of 59 (75%), the difference being statistically significant (p-value < 0.001). Over 93% (134/145) of students found this innovative peer-learning activity enjoyable.

Discussion: This is the first report of using this method of teaching in undergraduate medical education in Cambodia. Our results support the notion that students enjoy and prefer this way of learning neuro-anatomy to lectures. Further, students’ knowledge increased as a result of this peer-learning activity.

Conclusion: In the innovative peer-learning activity, neuro-anatomy will be learned in an effective, enjoyable and clinically relevant way, and this also supports self- and peer-learning. We plan to incorporate this into the undergraduate medical curriculum.

Take-home Message: We believe that the innovative peer-learning activity can transform the way students learn anatomy from a traditional, passive and teacher-centered way, to an active, student-centered and clinically relevant approach. This can be applied to a range of subjects and educational settings.

Fostering understanding of entities and professional conduct: pedagogical development of two anatomy courses in veterinary medicine

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Background: Veterinary medical education aims to move from lecture-based methods of teaching to active learner centered methods aiming to foster understanding of entities and professional conduct. The benefits of collaborative learning have been well documented in a variety of disciplines including anatomy curriculum.

Summary of Work: We examined two cadaver dissection periods of the gross veterinary anatomy curriculum. Besides the content learning aims, we addressed how the courses were developed, how students evaluated the courses, and how competences in collaborative knowledge work were learned.

Summary of Results: The very first dissection course (on muscles) highlighted particularly enthusiasm based on the practical and nature of the course, with challenges in the regulation of collaboration. The other course (topography) raised more positive aspects about understanding the learning content and learning form others, but also difficulties in collaboration.

Discussion: Doing oneself, practical application and professionalism were highlighted particularly in the first year course but concerns were raised by the need to learn numerous terms. Group work and learning from others were valued during the topography course but students also raised concerns that groups may learn different entities.

Conclusion: The main difference between courses in learning of collaborative knowledge work competences were related to the nature of the group work assignment. The topography course included element of collaboration to prepare a presentation, which advanced competences emphasized on collaboration on a shared object and integration of individual and collective efforts.

Take-home Message: We need to emphasize benefits of collaborative learning by encouraging students to share their findings not just within their own dissection group but also with other groups even when it’s not written out as a learning goal. This ties collaborative learning also more closely to the concept of professional conduct.
Background: Misconceptions about the organization of the cardiovascular system are common among medical students, and for some students persist even after the basic course on this subject (Ilona Södervik, Doctoral Thesis, University of Turku, 2016).

Summary of Work: As our dissections of the human heart are not synchronized with the cardiovascular course, we scheduled one day for voluntary self-tuition study of fresh porcine hearts from a slaughterhouse and an opportunity for virtual dissection using a Sectra Table and assessed student feedback with a questionnaire.

Summary of Results: 95% of the participating students found the porcine heart task useful and recommended its use also next year, compared to 60% for the Sectra Table task. Of free verbal comments 22 were positive, 1 negative about the porcine heart task, 5 positive and 22 negative about the Sectra Table task.

Discussion: Participation in this pilot study was voluntary, possible excluding students most in need of this learning opportunity. The overwhelmingly positive feedback concerning fresh porcine hearts encouraged us to extend their use to the whole course in the future.

Conclusion: Fresh porcine hearts are valid and inspiring representations of human heart anatomy.

Take-home Message: Porcine hearts from a slaughterhouse are more interesting and immensely cheaper than available virtual dissection platforms.

Background: An enduring debate around gross anatomy instruction is whether traditional human cadaver laboratories are beneficial to student learning. With the availability of computer-based instructional tools, many institutions are including these modalities into their roster of teaching tools. But how do these technology based tools impact learning?

Summary of Work: There are few studies which examine the effectiveness of computer-based, virtually augmented or simulated anatomical platforms for teaching gross anatomy. Given the growing popularity and possible role of these tools to visualize anatomy in a unique way, we obtained and assessed the effectiveness of these tools.

Summary of Results: Preliminary quantitative data of the platforms tested did not yield significant differences in effectiveness of learning over traditional formats. In the qualitative data students expressed increased confidence in understanding anatomical concepts and liked the ease of learning that the technical platforms allowed.

Discussion: While student perception regarding the utility of technology to enhance learning was deemed positive, more quantitative analysis is needed to conclude whether there are significant advantages of incorporating or replacing the traditional methods used in human anatomy instruction.

Conclusion: Computer and media based instructional tools are continuing to grow in function and technical capabilities. The incorporation of these interventions for teaching require careful review regarding their placement, effectiveness and perceived value.

Take-home Message: More evidence is needed to elucidate the role of computer based curricular changes.
**#7FF09 (2866)**

**Doughnut Rounds are an Effective Way to Learn Clinical Anatomy**

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**Background:** Doughnut Rounds (DRs) are a type of Self-Directed Learning which have been shown to be effective in teaching medical students compared with lectures alone (Bultrod, 2003). The purpose of this paper is to examine the effectiveness of DRs in learning the clinical anatomy of the lower limb among pre-clinical students.

**Summary of Work:** Following ethical approval, 17 Year 1 students attended six weekly grouped DR sessions. Students took turns to ask clinical anatomy questions to others in the group. All incorrect/correct answers were explained. Each student took an identical MCQ test before and after each session and a mock exam 4 weeks later.

**Summary of Results:** Average attendance was 67%. The average post-session MCQ scores increased by 39% for all DRs ($p=1.18 \times 10^{-7}$). Most students either agreed or strongly agreed that the sessions improved their anatomical knowledge (87%) and confidence (77%). Students also reported that their anatomical knowledge improved while preparing for the session (63%).

**Discussion:** There was a statistically significant improvement in the overall post-test MCQ score, indicating that the DR sessions helped students learn new material. Participants showed a greater improvement in their final examination results compared to non-participants suggesting that the benefits of DRs may extend beyond the immediate recall period.

**Conclusion:** Formulating, asking and answering questions during DRs significantly improves students’ anatomical knowledge in an effective and enjoyable manner, while improving confidence and communication skills.

**Take-home Message:** This first study of the application of DRs to preclinical medical students, specifically to the learning of the clinical anatomy of the lower limb, demonstrates that this type of Self Directed Learning can be effectively extended to other medical disciplines.

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**#7FF10 (3144)**

**A qualitative analysis of near peer teaching in an undergraduate anatomy course**

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**Background:** We have devised and instituted weekly near-peer teaching (NPT) to supplement the compulsory anatomy teaching in the second year of a six-year undergraduate medical course. This study sought to evaluate the perceived benefits of NPT from the perspective of the learners.

**Summary of Work:** 96 second year medical undergraduates participated in three, weekly NPT tutorials. Students were assessed academically on content of the curriculum before and after the course. All participants attending the final session were asked to fill in an online questionnaire regarding the benefits or otherwise of near-peer tutors in this context.

**Summary of Results:** The effectiveness of the teaching was indicated by significant improvement in assessment scores (paired $t$-test $p<0.05$). The most common themes in free-text comments regarding benefits of NPT were “Clearer explanations” (18/37), “An understanding of areas students often find difficult” (10/37), “Creating a comfortable learning environment” (9/37), and “Exam-orientated content” (7/37).

**Discussion:** The themes identified can be considered benefits of the cognitive and social congruence provided to students by NPT and are consistent with findings by Ten Cate and Durning. “Exam-orientated content” in NPT is an important subgroup of social congruence in that it recognises the desire for such teaching amongst students.

**Conclusion:** The themes identified demonstrate that supplementary near-peer led anatomy teaching is useful to students and can act to facilitate their learning.

**Take-home Message:** We recommend NPT be incorporated as a supplement to anatomy teaching delivered at medical school to undergraduates.
**Conclusion:**

Rounds in anatomical students is as four.

**Summary:**

Students of Obstetrics in the UK apply clinically. Take O&G teaching to improve learning outcomes in anatomy and physiology: is there evidence? Mirela Slomik, Faculty of Health Sciences, Oslo and Akershus University College, Oslo, Norway

**Background:**

Teaching anatomy and physiology undergoes changes from traditional lecture-based teaching to innovative approaches including problem-based and computer-assisted learning. The aim of this study is to examine the current literature and answer whether the students exposed to innovative teaching methods achieve enhanced learning outcomes, and which innovative methods are effective.

**Summary of Work:**

This study is a systematic literature review. The two researchers conducted search independently of each other in November 2016, participated in the data selection process, discussed and agreed upon included articles according to inclusion criteria at every stage of the process.

**Summary of Results:**

The innovative methods identified in the 12 included articles were grouped according to interventions used in four groups: video streaming, problem-based learning, hands-on methods and classroom performance system. The outcomes of the innovative teaching methods were variable. Assessment methods in themselves seemed to have an impact on the measured outcomes.

**Discussion:**

Video streaming had either neutral or worse effect, problem-based and hands-on methods the same or better effect than traditional lecture-based teaching. Classroom Performance System offered better results and class attendance. This literature review points to a need for further research on applying innovative methods in teaching anatomy and physiology.

**Conclusion:**

Applying the innovative teaching methods showed variable effect on students' learning outcomes. Although some of the methods had promising results, those new methods should be introduced with reflections regarding potentially negative effects. This study points to the importance of assessment and relation between teaching methods and assessment methods.

**Take-home Message:**

- When introducing innovative teaching methods attention should be paid to potentially negative effects.
- There should be coherence between teaching and assessment methods.
- Further research is needed to confirm effects of innovative teaching methods on learning outcomes.
Development and Validation of a minimal invasive surgery skill learning instrument: Preliminary Results

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Background: Learning minimal invasive surgery skills is young surgeons’ major concern. Although simulators are a reference in improving surgical performance, lacking points remain. Indeed a lack in feedback, spatial abilities and cognitive load seems to hinder an efficient learning process. In consequence, engineering relevant basic skill learning instruments is needed.

Summary of Work: We designed and developed an instrument targeting the learning of basic surgical skills by considering relevant cognitive cues e.g.: psychomotor skills, spatial abilities, learning and haptic feedback, cognitive load. We conducted content and relation with experience validation process by submitting our instrument to audiences from different areas e.g. urology, visceral...

Summary of Results: 77 participants (17 experts; 12 experienced interns; 28 young interns and 20 novices) assessed the instrument. Content evidence ratings showed no significant differences (p = 0.126). For relation with experience, we found significant differences between 3 levels of practice for at least two variables e.g. time (p < 0.001) and motion fluidity (p < 0.001).

Discussion: Homogenous and good ratings attest of the quality of the devices’ content and resemblance with reality. Results also suggest that performance on the device requires good surgical skills as the scores revealed 3 levels of practice. Experts and experienced interns outperformed young interns who in turn performed better than novices.

Conclusion: Our product is useful to different areas of MIS, because not restricted to a specific procedure. Providing haptic feedback and aiming the learning of surgical psychomotor skills through a spatial task (trajectory) was innovative regarding the literature. Perspectives would be to complete the scientifically validation procedure e.g. reliability and consequences.

Take-home Message: Future investigations need to develop basic surgical skills learning by considering current cognitive hindrances. Moreover, means enabling the initial learning stage of surgical skills should be targeted to provide a solid background. The engineering of affordable but reliable instruments will facilitate their implementation in current curricula and their use.

“Statistic of the Month”: A new, interactive and engaging way to tutor trainee surgeons in statistics

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Background: Since 2007, the University of Edinburgh and the Royal College of Surgeons (RCS) of Edinburgh have launched seven successful online Masters Programmes for surgeons in training: two MSc programmes (content aligned with the intercollegiate Membership of RCS examination), and five ChM Programmes preparing for Fellowship of the RCS examinations.

Summary of Work: While all other modules (e.g. anatomy, physiology, pathology, etc.) are tutor-led, with activity graded discussion boards and a final examination, teaching statistics has been in the form of an online- Helpdesk, or links to static resources. This academic year (2016/2017) we introduced a new statistics module called “Statistic of the Month”.

Summary of Results: The Statistic of the Month is a series of web-based interactive applications created using the R statistical programming language. Students are given already visualised sample data to interact with (e.g. they can change the number of observations). For each configuration, the application displays the p-value (an indicator of statistical significance).

Discussion: On the associated discussion board, the tutor asked the students a series of thought provoking questions about how certain parameters affected the results. This level of experimentation gives the student a more thorough understanding of statistical concepts, and as such they are more likely to retain the information.

Conclusion: The voluntary uptake and impact of introducing statistics into the already heavy-workload of surgeons differed greatly between the pilot releases. More engagement was seen in the senior (ChM) versus the junior (MSc) programme, possibly indicating the late trainee stage realization of the necessity of statistical understanding in a clinical career.

Take-home Message: We are conscious that statistics as a subject is not popular amongst many surgical trainees, with many experiencing “statistics anxiety”. Thus, we adopted a constructivist approach in which hands-on activities and visualised interactive datasets enabled students to construct new knowledge and become more independent learners and problem solvers.
A Longitudinal Study on Medical Students’ Attitudinal Changes towards Cadaver Dissection in a Thai Medical School

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Background: Cadaveric dissection has been globally used as the core anatomical teaching tool for medical students including in Naresuan University, Thailand. However, dissection is being gradually reduced and even suggested or replaced with prosection. This study aims to assess the students’ attitude towards cadaveric dissection before and after exposure to dissection.

Summary of Work: A longitudinal study was conducted amongst 168 second-year medical students in 2016 at the Department of Anatomy, Naresuan University. Three questionnaires were used to collect relevant data from the students. The questionnaires were distributed in 1 week before the initial dissection and after practicing dissection for 8 and 16 weeks.

Summary of Results: About 94.65% were Buddhist. Most students displayed significantly increasing interest and excitement on subsequent, 8 and 16 weeks exposure to dissection (P<0.05). Approximately 50% considered the dissection room stressful. The negative physical symptoms were about 80% after dissection encounter. Over than 90% considered that time spent in the dissection room valuable.

Discussion: About half of students experienced the stressful during practicing dissection that may be influenced by the chemical odor and eye irritation leading to be uncomfortable. However, most of them concerned the dissection had very necessary for anatomy teaching.

Conclusion: This present study reported that the attitude of most of the Thai medical students showed interest in cadaveric dissection. The environment of the dissection room should be concerned because it could be a major factor inducing stress for medical students.

Take-home Message: Thus, human cadaveric dissection is still important and fundamental to effective learning in anatomy.