Use of *Anatomage* tables in a large first year core unit.

Georgina Fyfe
Faculty of Health Sciences, Curtin University
email: g.m.fyfe@curtin.edu.au
Sue Fyfe
Faculty of Health Sciences, Curtin University
email: s.fyfe@curtin.edu.au
Danielle Dye
School of Biomedical Sciences, Curtin University
email: D.Dye@curtin.edu.au
Hannah Crabb
School of Biomedical Sciences, Curtin University
email: hannah.crabb@curtin.edu.au

Anatomage tables were incorporated into a large core unit in health sciences at Curtin University to replace cadaver material. Students worked in groups of eight around the table, as one of several stations in weekly workshops facilitated by tutors. Tutors and students completed a survey asking about their use of technology and their experiences with the Anatomage tables. Tutors also contributed to focus groups (n=16), and student interaction around the table was recorded on camera. Student survey response was 18% (n= 326) and for tutors, 69% (n=22). Preliminary analysis suggests that most students found the Anatomage tables good for ideas of scale and relationships of organ structures, and liked being able to rotate the images, but were less impressed with graphics quality and the limitations to group interaction. Tutors felt well-prepared for using the tables but were frustrated by technical issues, and few thought the tables were a good investment.

Keywords: Anatomage undergraduate student engagement health sciences.

Background

A core unit for all Health Science courses at Curtin University, Human Structure and Function 100 (HSF100), ensures that students learn basic human biology across most body systems. Enrolments in HSF100 are large (around 2200 students in semester 1 and around 430 in semester 2 each year). Previously, human cadaver specimens were used for these classes but with increasing class sizes and demands on wet lab facilities for more specialised classes, an alternative learning resource was sought. Anatomage tables were incorporated into HSF100 classes for the first time in semester 1, 2013. Anatomage tables use digitized images in an interactive way to show the structures of the human body, and provide a large-scale "iPad-like" experience for collaborative learning in class. Different body systems such as the circulatory and gastro-intestinal systems can be selected and explored with touch-screen technology, but only one user can touch the screen at any one time. Both male and female body images can be rotated, virtually sectioned, and resized. In this study the male images were from CT scans so organs such as the liver showed full internal detail, whereas the female organs were computer-generated graphics that were very clear but empty of internal detail. Software updates will allow for more detailed images of internal organs and muscles for both image sets. HSF100 students have a weekly two-hour workshop facilitated by two tutors over the 12 week semester. Generally there are between 45 and 50 students in each class, and students work through various stations in groups of eight. The Anatomage tables were incorporated into 6 of the 12 weeks of HSF100 workshops. Although many have researched online

anatomy resource use with students (Choudhury & Gouldsborough, 2012; Johnson, Palmer, Burton, & Brockhouse, 2013; Tworek, Jamniczky, Jacob, Hallgrímsson, & Wright, 2013) there is no literature reporting student or tutor responses to the incorporation of the Anatomage tables in face-to-face undergraduate classes.

Aims of the project

Major aims of the project were to;

1. Review the way in which Anatomage tables were incorporated into unit content and classrooms
2. Gather perceptions of students and tutors regarding their experience with the Anatomage tables.

Method

Data were collected from staff and student focus group transcripts, tutor and student surveys and classroom observation. An online survey was developed for both students and tutors and served using Qualtrics survey software. Students were asked to provide some basic demographic information, answer some questions about how they used technology for learning, and recall aspects of their experiences using the Anatomage table in HSF 100 classes. The tutors were asked about their teaching experience, preparedness for using the Anatomage table and their responses to using the tables. Three focus groups were conducted for tutors, and one semi-structured interview was conducted with the Unit Coordinator and her deputy. In-class interactions were observed using fixed camera video footage, and scored for student engagement.

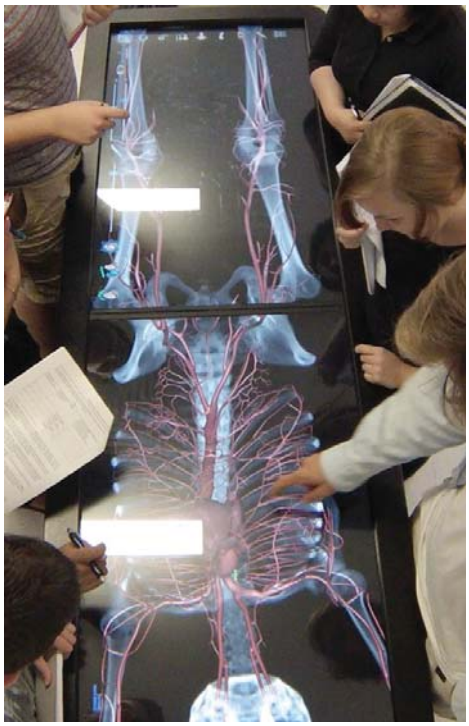

Figure 1: Students using *Anatomage* in HSF100

Preliminary results

Response to the online student survey was 18% (n=326) with females making up 87% of the respondents. Most respondents had a smart phone with 15% of females and 10% of males using anatomy apps on their phone. Almost half had a tablet such as an iPad but few respondents reported using Anatomy apps to help them study HSF100, and only 7% used their tablet with anatomy apps in class.

Table 1 HFS100 Student technology use

Technology use by students % (n= 326)

Own a smart phone	90
Own a tablet	43
Used anatomy apps to help them study HSF100	20
Used tablet with anatomy apps in class	7

More students reported that using Anatomage was moderately or very helpful to them in understanding the relative sizes of different organs and the relationships between organs rather than helping them use correct anatomical terminology (Table 3) but students valued animations and videos available in the class models and plastinates more than the Anatomage tables (as shown in Table 2). Student respondents reported not having enough time to use the tables (70%) and problems with the table "freezing", being hard to control, having images of poor quality, and allowing only one person to interact with it at one time. On the positive side respondents reported that they liked the 3D aspect, seeing the sizes and relationships between organs, using the slice tool to see cross sections and not having to see wet specimens.

Table 2 Students evaluation of learning resources usefulness

Student evaluation of learning resources usefulness	%
Animation and videos	78
Models	62
Plastinates	60
Anatomage tables	36

Of the 32 tutors teaching the unit, 22 (69%) responded to the Qualtrics survey. About half of these respondents were experienced tutors with 5 or more years experience and two thirds of them (64%) had taught HSF 100 previously, using cadaver specimens. Most (73%) felt well prepared for using the Anatomage tables in class but only 9% said that it worked well for them every time they used it. They felt, like the students, that table was moderately or very helpful to the students in understanding the relative sizes of different organs rather than helping them use correct anatomical terminology, although they felt that Anatomage helped students understand relationships between organs (more than the students did, as shown in Table 3).

Table 3 Students' and tutors' views on usefulness of the Anatomage table (% moderately or very helpful)

	Students (n=326)	Tutors (n= 22)
Understanding the relative sizes of different organs	79.5	71.4
Understanding the relationships between organs	56.7	72.7
Helping use correct anatomical terminology	44	41

Some tutors welcomed being able to view the systems in isolation and show hard-to see structures such as lymphatic vessels with clarity. However, many tutors felt the ability to handle cadaver material allowed deeper learning opportunities, especially in regard to the range of variation.

Tutor focus group transcripts are yet to be analysed using NVivo, but trends are emerging. Tutors reported that, while the initial exposure to the Anatomage table engaged the students, this decreased as the semester progressed, and technical issues were hurdles in some classes. Some tutors reported that students' expectations of the quality of the graphics were unmet, but they enjoyed the dynamic aspects of the table, especially being able to slice and rotate sections. This feature, they believed, helped students consolidate learning around body planes and organ relationships. Some tutors welcomed the Anatomage tables as a replacement for human cadaver material that had disturbed some students to the detriment of their learning. However, few tutors thought it had been value for money.

The Unit Coordinator and her deputy reported trialing different amounts of direction for the students in the workshop notes for the Anatomage station. This they believed was of benefit to the tutors but my have discouraged exploration by the students. However, arranging pre-determined settings ("presets") of particular systems or image views saved time in class.

Discussion

Our results support the findings of Thompson (Thompson, 2013) that students classed as "digital natives", i.e. those who have grown up with digital technologies, are not using a raft of applications available to them on the digital devises they possess. Although the Unit Coordinator feared that using presets may discourage exploration it is possible that students would not necessarily do so if presets were not used. Students were critical of the quality of graphics in the Anatomage table, and some lost interest after the initial novelty wore off. Proportionally more males than females reported using computer applications for learning anatomy material, although this would have included units other than HSF100. Males may use more individual on-line study resources because they may be less likely to study in a group (Sanders et al., 2007).

Choudhury and Gouldsborough reported that students using on-line resources for the study of anatomical material missed the interaction of working in groups around a teaching resource (Choudhury & Gouldsborough, 2012), and this was a disadvantage mentioned by HSF100 students. Whereas a group of eight can effectively work around other resources such as a large model to explore different aspects, Anatomage only allows one user at a time, so eight students is too large a group around the Anatomage table for effective group processes to occur. While there is greater appeal in working on a larger scale with touch screen technology (Echtler & Wimmer, 2013; Hardy, 2012) multi-user capabilities are important to allow a more collaborative experience for learners. Johnson found that some on-line anatomy applications encourage individual work, and that students prefer to have a dialogue either with other students or with a tutor (Johnson et al., 2013).

Some of our results suggest conflicting views on the amount of direction, such as written questions or table presets, to give students at the station. Students and tutors found Anatomage of use in some syllabus areas such as organ scale and relationships, but less so in other areas, indicating that there may be particular contexts in which more direction in instructions to students is required.

Further work

Camera video will be analysed for engagement and interaction and the results compared with student and tutor responses to the survey. We will compare themes emerging from the student and the tutor data, and explore the apparently off-task behaviours (Judd & Kennedy, 2011) of students around the Anatomage table. Students entering the follow-on unit in their course will be asked about their reflections of what they learned from the Anatomage table, and further cohorts of students will be asked to assess themselves as "digital natives" or "digital emigrants" (Thompson, 2013). It would also be interesting to observe other aspects of the way in which students work with Anatomage, such as removing or clustering particular images (Hardy, 2012), or the order in which students browsed or followed specific prompts in their workshop notes.

Acknowledgements

The authors thank Mr Randy Strack for valuable contributions to this research, and the Curtin University students and staff who participated in this project.

References

Choudhury, Bipasha, & Gouldsborough, Ingrid. (2012). The use of electronic media to develop transferable skills in science students studying anatomy. *Anatomical Sciences Education, 5*, 125-131.

Echtler, Florian, & Wimmer, Raphael. (2013). *The interactive dining table.* . Paper presented at the CHI 2013 Workshop on Blended Interaction Paris, FR.

Hardy, John. (2012). *Experiences: A Year in the Life of an Interactive Desk*. Paper presented at the Designing Interactive Systems, Newcastle UK.

Johnson, Ian P., Palmer, E., Burton, J., & Brockhouse, M. (2013). Online learning resources in anatomy: what do students think? *Clinical Anatomy, 26*, 556-563.

Judd, Terry, & Kennedy, Gregor. (2011). measurement and evidence of computer-based task switching and multitasking by "Net Generation" students. *Computers & Education, 56*, 625-631.

Sanders, K., Hill, J., Meyer, J., Fyfe, G., Fyfe, S., Ziman, M., & Koehler, N. (2007). *Gender and engagement in automated online feedback in first year human biology*. Paper presented at the ICT: Providing Choices for Learners and Learning, Singapore.

Thompson, Penny. (2013). The digital natives as learners: Technology use patterns and approaches to learning. *Computers & Education, 65*, 12-33.

Tworek, Janet K. , Jamniczky, Heather A. , Jacob, Christian, Hallgrímsson, Benedikt, & Wright, Bruce (2013). The LINDSAY Virtual Human Project: An immersive approach to anatomy and physiology. *Anatomical Sciences Education, 6*(1), 19-28.

Author contact details: Georgina Fyfe, g.m.fyfe@curtin.edu.au

Please cite as: Fyfe G., Fyfe, S., Dye, D., Crabb, H. (2013). Use of *Anatomage* tables in a large first year core unit. In H. Carter, M. Gosper and J. Hedberg (Eds.), *Electric Dreams. Proceedings ascilite 2013 Sydney*. (pp.298-302)