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Teaching Anatomy with Multiple Techniques

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Summary
I will be describing different teaching strategies that could be used to teach anatomy to large groups of students. It is important to use multiple techniques in order to reach as many different types of learners as possible. Furthermore, in my experience anatomy has only been taught by using the transmission technique (i.e. lecture), and with today's technology there are many other ways that could be used. This is an important topic for people in my discipline as most anatomy classes contain over 200 students, and these students will all have different learning styles. In order to effectively instruct all of these students to the best of our abilities we need to use a variety of teaching strategies above and beyond the normal course of lecture.

Keywords
anatomy, multiple approaches, interactive

Objective

This course will demonstrate multiple techniques (including a combination approach) that could be used to instruct large groups of students and will therefore instruct the instructors as to possible ways to expand their teaching methodology.

Summaries of Pedagogical References

Five references will be used for this project. They are as listed and summarized below:

1) Chan, L.K. (2010) Pulling my gut out – simple tools for engaging students in gross anatomy lectures Anat. Sci. Educ. 3: 148-150.

This paper discussed the importance of using demonstration as a supplement to lecturing anatomy. The author used two unique methods of teaching gut anatomy. Firstly, he used an apron and a movable piece of tape to describe the rotation of the gut during embryonic development (pictures within the publication). Secondly he used a piece of fabric 5 feet by 11 feet with a hole cut in the middle. He then wore this fabric (with his head sticking through the hole) and with his arms extended to either side, his body then represented the uterus (his head and body), fallopian tubes (his arms) and the peritoneum (the fabric)(pictures within the publication). The author suggested that the use of these demonstrations was well-received by his students according to the end-of-term assessments.

2) Chase, C.C. and K. M. Geldenhuys (2001) Student-centered teaching in a large heterogeneous class. Medical Education 35: 1071.

This paper described the challenges involved in teaching histology to large groups (>200 students) of medical and dental students with a wide range of academic ability and languages (Afrikaans or English). The Afrikaans lectures were replaced by self-study with bilingual take-home assignment and a small group discussion (in order to discuss and to mark the assignments). Upon classroom assessment, 82% of the students agreed with the effectiveness of this approach, the end-of-term marks were higher, and there was minimal extra work for the professor.

3) Kerby, J., Z.N. Shukur, and J. Shalhoub (2010) The relationships between learning outcomes and methods of teaching anatomy as perceived by medical students. Clinical Anatomy, Early Online, 1-9.

This paper discussed the efficiency of using different teaching strategies to teach anatomy to medical students in the United Kingdom. The strategies examined were the use of dissection, prosection, didactic, models, computer assisted learning (including slides and video), and the use of living people and radiology (i.e. X-rays). Both students and professors agreed that the use of dissection and/or prosection were the most efficient teaching method. However, this is not always an option as a teaching tool. The other methods were ranked by professors and students as follows: living people/radiology, computer assisted learning, didactic, and lastly models. This investigation has shown that lecture is not necessarily the most effective way to teach anatomy, and that both teachers and students prefer other methods. The authors suggest that a multi-modal approach should be taken.

4) Sturges, D., T. W. Maurer, and O. Cole (2009) Understanding protein synthesis: a role-play approach in large undergraduate human anatomy and physiology classes. Adv. Physiol. Educ. 33: 103-110.

The authors investigated the use of role-play as a teaching strategy in a large undergraduate anatomy class and compared it to traditional lecture (~150 students per type of class). For example, the students were instructed to think about the transcription of DNA. One row of students acted as the DNA and a second group of students acted as the complementary mRNA. Students had signs dictating which molecule that they were and they were required to stand according to the appropriate base-pairing. The authors found that the more interactive class was at least as effective as a teaching strategy; however the students felt that they were more engaged and satisfied.

5) Veneri, D. (2010) The role and effectiveness of computer-assisted learning in physical therapy education: A systematic review. Physiotherapy Theory and Practice, Early Online, 1-12.

This publication is a review of the published literature involving the use of computer assisted learning in physical therapy education, including anatomy. The findings of this review were that the initiation of computer assisted learning has been slow due to the cost; however costs of computers and software are becoming more reasonable in the current day. This review also discussed the differences between traditional lecture and computer assisted learning. The articles that were discussed within describe a consensus that computer assisted learning is at least as effective as traditional instruction.

Content and organization

Total Time: 90 minutes

Duration	Subject	Activity	Purpose
15 minutes	Introduction	Lecture	Introduce the concepts of different learning styles, teaching strategies, and learning objectives. Emphasize that there are many different styles of learning and generally only one traditional method of teaching in anatomy, i.e. lecture.

Duration	Subject	Activity	Purpose
10 minutes	Traditional style of anatomy lecture	Present a traditional lecture with notes available on-line in advance. Topic is the anatomy and physiology of the kidney.	To display the traditional teaching method used in anatomy. To familiarize the participants to the group discussion format.
10 minutes	Group discussion	Anonymous questions and comments followed by group discussion.	Classroom assessment to assess the effectiveness of this strategy.
10 minutes	Bone and muscle anatomy of the hand.	Multimedia approach. Coloring sheets from "The Anatomy Coloring Book" by W. Kapit and L.M. Elson (2002, 3rd ed.) will be provided for the participants to color if they choose. Non-latex gloves will be provided for the participants to wear and to draw on. A large model of the hand will be made available, and an overhead (or PowerPoint slide) will be projected that displays the anatomy.	Lecture the anatomy of the hand while pointing out the structures on both the slide and the model. Students will concurrently draw structures on the glove provided. Purpose is to expose the students to a multimedia approach to teaching and learning anatomy that involves visual, auditory, and kinesthetic approaches.
10 minutes	Group discussion	Anonymous questions and comments followed by group discussion.	Classroom assessment to assess the effectiveness of this strategy.

Duration	Subject	Activity	Purpose
10 minutes	Muscles of the lower leg.	Flash cards with small group discussions. Participants will be given flash cards at the beginning of the class and participants will be asked to pair-up, get into a small group, or work alone according to their comfort level. They will briefly study the cards together and quiz each other (or themselves).	This will help participants see, in an objective, scientific way, that their input as instructors has the ability to significantly change the student group work experience.
10 minutes	Group discussion	Anonymous questions and comments followed by group discussion.	Classroom assessment to assess the effectiveness of this strategy.
15 minutes	The seminar will be concluded with a group assessment and summary of the entire presentation. The group assessment will be a chance for the participants to discuss the effectiveness of the teaching strategies demonstrated and to discuss the inherent strengths and weaknesses of each method that was demonstrated. At this point, some of the questions and comments collected after each activity could be re-evaluated using the entire seminar as context. Furthermore, while addressing the relevant questions and comments that were asked after each section, more questions and comments could be collected at this point which address the whole seminar.		

Presentation strategies

As described above, multiple presentation strategies will be used including lecture, computer assisted learning (on-line availability of the notes/slides), use of active demonstration (drawing on clothing), and small-group discussion. Traditional lecture was planned to allow for comparison to the other teaching strategies. The on-line availability of the slides/notes was used in order to introduce the use of computer assisted learning as per Veneri (2010). The use of active demonstration was planned in order to show that this technique is at least as effective as traditional lecture, and that students would experience greater satisfaction as per Chan (2010) and Sturges et al (2009). Flash cards and small group discussion was planned in order to show that this could be more effective than traditional lecture as per Chase and Geldenhuys (2001). During the 15 minute group assessment and summary, I anticipate that the conclusion of the group will be that a multimedia approach will be the most effective teaching strategy, as proposed by Kerby et al (2010).