Working Toward a More Engaging Gross Anatomy Course for Optometry Students

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Anatomy is commonly taught using didactic lectures, emphasizing clinically relevant facts and guiding students through the body by cadaveric dissection with the help of atlases and clinical cadaveric images.[1-3] Students are expected to independently study from recommended atlases and textbooks. This general didactic approach has been substantially improved with wider availability and more reliance on models, imaging, simulation and online tools[2,4-6] to enhance the learning experience. In addition, team-, problem- and case-based learning strategies (TBL, PBL and CBL)[1,4,7-12] are being adopted at many institutions to make learning more interactive. Although the importance of multimodal teaching has been widely recognized and assessed, the didactic tools of anatomy education are in need of overhauling and updating, especially in regard to keeping up with the pace of technology and the tech savviness of today's average student. A challenge is the widespread belief among optometry students that their future profession "begins and ends in the orbit." The failure on the part of many students of health sciences other than medicine to recognize the importance and necessity of the "big picture" makes the task of teaching anatomy especially challenging.

Here, we describe how several new teaching tactics were introduced into a Gross Anatomy of the Head and Neck course for students of optometry. The additions were meant to encourage self-directed learning and included modified elements of TBL/PBL, online anatomy resources and video-podcasts (i.e., vodcasts) of the upcoming dissections. The goal was to highlight the relevance of knowledge of gross anatomy of the head and neck to the students' future profession and make the learning experience intuitive by supplying frequent clinical correlates. We report how students perceived the implementation of each new element, highlight issues that arose and make suggestions for improvements as we deem appropriate.

Course Design

The course taught in 2011 was structured as a standard didactic anatomy course consisting of lectures, clinical presentations by student groups and dissections. At the end of each lab, an in-lab quiz (n=5) was given. See **Table 1** for the value of each of these assignments.

Table 1
Original and Revised Course Components

Component	Percent of Final Course Grade	
	Original	Revised
Midterm written examination	20	20
Midterm practical examination	20	20
Final written examination	20	20
Final practical examination	20	20
Introductory take-home quiz	4	4
Attendance	2	2
In-lab quizzes	8	N/A
Team dissection tagging	N/A	8
Clinical presentations	6	N/A
Peer evaluation (n=2)	N/A	4
Jung Typology Test	N/A	2
Total	100	100

Prior to the beginning of the 2012 course, a class-appointed representative of the preceding year's class was interviewed to gain insight into how the different elements of the course resonated with the class. The primary goal was to use the information gained from student feedback to create a revised course that meets the curriculum's requirement and is also didactically organized to be intuitive, clinically focused and fun. The most frequent critique was the request for more guidance prior to performing the dissections (in addition to the requirement to read the dissector).

2012 revised course design: new features

In response to the feedback, several new elements that were considered helpful were added. Others, perceived as not helpful, were omitted. The course grading rubric was revised to reflect the increased emphasis on team learning (especially team dissection tagging and peer evaluations).

Team selection

Working as a team doing dissections promotes both psychosocial development and attitudes towards professionalism and teamwork.[1,9,11,13] Teams were not selected alphabetically as was previously done. Instead, students were asked to complete a short Jung/Myers-Briggs-style typology test online (http://www.humanmetrics.com/cgi-win/jtypes2.asp) and supply their four-letter result to the new course director. The individual results were used to assemble heterogeneous teams based on typology and to prevent students from choosing their teams based on pre-existing cliques. Details about the main temperaments are found online (http://www.myersbriggs.org/my-mbti-personality-type/my-mbti-results/how-frequent-is-my-type.asp).

Vodcasts

In response to the most frequent request for more guidance before lab, the course director created vodcasts for the students to view ahead of lab. A vodcast is a narrated video presentation. The vodcasts described the order of dissection (based on Grant's Dissector 14th Ed.) for the day, showing suggestions and useful images and pointing to additional resources. The 10- 15-minute vodcasts were created using the recording feature in PowerPoint 2010 and were uploaded to Blackboard for the students to access. Previewing the vodcast was recommended to the students, and it was stressed that it did not replace the requirement to pre-read the dissector.

Prosection

To provide additional "hands-on" help to the students, the course director performed each dissection by himself prior to the dissection day. This prosection was fitted with four tags per lab, each representing a key structure of the respective lab. This provided an authentic template for the dissection the students were going to perform.

Team tagging dissections for grades

To give concrete goals for dissection, each team was assigned four items per lab (different items per team as far as possible). This created a sort of permanent practice practical exam, and — as the correct tagging of the structures contributed to the overall grade (see below) — enhanced motivation and engagement during lab time. In addition, teams that found especially good structures, e.g., well-dissected and of representative anatomy, noted this on a white board in the anatomy lab for all other teams to review.

Special topics day

To show and underscore how gross anatomy of the head and neck is related to optometry, a "special topics day" was initiated after the midterm examinations. This day had two parts. During the first two hours, the students were asked to solve clinical anatomy case studies working in their assigned teams. Following this session, faculty from the School of Optometry gave guest lectures, highlighting how the disciplines of optometry and gross anatomy are inter-related.

Peer evaluation

As done frequently in TBL, the students were asked to fill out peer evaluations at midterm and at the end of the course. There are many different ways peer evaluations can be used.[14-16] For example, they may or may not count as part of the grade. It was decided to use graded peer evaluations, the assumption being that the students are (mature) adults, know the causal link between work and reward, and appreciate that everybody will be held responsible to a small degree for their actions, or lack thereof. In total, the peer evaluations made up 4% of the final grade. Design of the questionnaire was as described by Michaelsen et al.[14,17]

Bonus points on final practical and written exam

On the final written and practical exams, a total of six bonus questions were included (three practical and three written). The rationale was two-fold: 1) there was no curving or rounding of grades, 2) to compensate (or overcompensate) for any points lost in peer evaluations.

Interactive media and other resources

To make lectures more interactive, to enhance the learning experience and to account for attendance, an audience response system (ARS) was used. Studies have shown that along with real-time feedback, ARS usage correlates positively with student performance on summative examinations.[18] By asking specific on-topic questions throughout the lectures, the students were able to self-assess their anatomy knowledge.

Students were granted access to the anatomy lab for study 24/7. Apart from their dissections, there were also a number of anatomical models available for study. Today's students are generally very computer and tech savvy. An increasing amount of interactive online resources are available for anatomy training. As stated by McNulty and colleagues, "The future of anatomy teaching must rely more on visual aids outside of the dissection room as students who accessed web-based, computer-aided instruction resources scored significantly higher on examinations than students who never accessed the online content."[6] With this in mind, several select online and interactive resources were pointed out to the students. These included the award-winning Aclands DVD Atlas of Human Anatomy,[19] access to 3D Human Anatomy Software (Primal Pictures Interactive Anatomy, Anatomy.tv) and links to other academic institutions' anatomy homepages that contain learning modules and dissection videos (University of Michigan, University of Wisconsin School of Public Health).

Unfortunately it was not possible to separate the lecture day from the day of the corresponding dissection. To compensate for this, several changes and additions to the course content were made. The introductory, open-book take-home quiz on the introductory chapter of the required anatomy text was kept with the intention to help introduce out-of-class expectations and serve as a potential motivator because it counted toward the course grade. Lecture time was reduced from two hours to approximately one hour, and lab time was extended from two to three hours per session. There was a voluntary open-lab session on Wednesday for two hours where instructors were present and students could come to lab to study and receive guidance if needed. Also, on the weekend before the midterm examinations, instructors were available in the anatomy lab for several hours each day.

Outcome and Student-Derived General Course Critique

The average grade in the class was 84.5%. One student withdrew, and one student failed the course. None of the students objected to the team selection strategy by typology test.

Students indicated the vodcast was a very helpful tool that facilitated the following dissection in lab. However, despite the vodcast, dissector pre-reading assignment and other available resources, students often came to lab underprepared.

The prosection was frequently used by the student groups as a guide and reference, and tagging the dissections for points resonated well with the students in general. Students indicated the special topics session was beneficial because it allowed them to work together at solving clinical cases.

The least favored element of the course was the peer evaluations and the fact that they counted for a portion of the final course grade (albeit small). It was perceived that peer evaluations "are not really fair." The students exhibited a strong dislike of being required to rate their peers' accountability (e.g., preparedness, sharing knowledge, timeliness). The majority of students attempted to give all of their peers full scores in all rubrics, making it necessary to distribute a "clarification on peer evaluations," which possibly exacerbated the general resentment of this form of evaluation.

As there was no curving or rounding of grades, and also due to the great discontent about graded peer evaluations, bonus questions were included at the final examinations as described previously.

The optional, instructor-facilitated lab time on Wednesdays was poorly attended. Predictably, attendance increased closer to examinations, and on the weekend before the midterm examinations the majority of students went to lab at some time. It should be noted that it was not possible logistically for instructors to be in the anatomy lab on the weekend before the final exam, which caused some discontent among the students. Online resources were not used frequently, or at least students did not report using them.

Team selection using the typology test seemed beneficial, as no signs of disharmony were observed among the teams. Despite the indication that vodcasts were helpful in preparing for dissection lab, the fact that many students would still come to lab underprepared highlighted the unwillingness of some individuals to actually utilize these and the other available resources without the direct pressure of an examination on the content, e.g., a pre-lab exam. Due to this lack of voluntary pre-class preparation, in the future, it is planned to introduce a "readiness assurance test" (Michaelsen, 2004) based on the dissection and the pre-reading material.

Having numbered tags on the prosection together with an identifier key gave students quick access and confirmation of vital structures without instructor help and encouraged self-directed study. Although grading tags necessitated extra time for the instructors in lab, the time was in general negligible, and it was very beneficial for the students to have basically all structures they were responsible for tagged across their respective dissections. Also, having specific structures as goals kept dissectors communicating with each other and increased team cohesion.

Students indicated the special topics session was beneficial because it allowed them to work together at solving clinical cases. In the future, to maximize student team cohesion and productive interaction, we plan to use more of a TBL approach for the entire course. Inviting faculty from the School of Optometry as guest lecturers also resonated very well with the students. Although the main goal of creating a clearer tie between optometry and gross anatomy was achieved, one concern was the additional specific information and the depth at which it would be required for the final examination. To put the students' minds at ease, only specific questions about the most quintessential message from each of the guest lecturers' presentations were asked.

If a graded peer evaluation system is to be used, it has to be unmistakably clear in the instructions how points can be allotted. In the future, correct completion of these evaluations will count towards the grade, but the evaluation will not influence their peers' grades.

Predictably, the students appreciated the inclusion of bonus questions, a feature that will be continued in the future.

Conclusion

Teaching anatomy to health professions students who do not perceive the need for the course creates special challenges. Highly specialized areas such as head and neck anatomy can be particularly challenging, no matter how creatively they are packaged. The implementation of technology such as vodcasts or approaches such as preparing a prosection for review and using graded team dissection tags can be valuable instructional methods that are well-accepted by students. Emphasis needs to be on specific preparation for the dissection and there should be constant reminders of how this relates to the students' future profession. A TBL-based approach may also be an efficient way to ascertain student preparedness (readiness assurance) and facilitate interactive learning (with structured team application activities).

In this course, we have tried to unite several different learning methods, supported by a light scaffold of CBL/PBL/TBL strategies. We learned that, in line with

the saying "you can lead a horse to water but you can't make it drink," even if a variety of learning tools are available to students they still may not study before lab. This conundrum may be alleviated with a full-on TBL approach, which includes short, individual and team-readiness assurance tests before lab.

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ANNOUNCEMENT

A Message from the World Council of Optometry (WCO)

The WCO is holding its first World Congress of Optometry in Colombia next year.

This event, which will take place in Medellin, Colombia, Aug. 14-16, 2015, in conjunction with the Federacion Colombiana de Optometras (FEDOPTO), will feature speakers and delegates from all over the world. Join your colleagues for the latest in continuing optometric education combined with exciting social events that highlight the culture of Colombia.

We look forward to seeing you in Medellin — a thriving city of culture, tango and beautiful scenery!