An orthopedic night in emergency:
Engaging student interest through application

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Introduction

The study of musculoskeletal (MSK) anatomy can be a daunting task for both the students and the teacher, especially in the cases of large class sizes (300+ students), and when laboratory sessions are not available (due to the high enrolment in these courses). With this in mind, our research project was untaken with the goal of developing interactive, in-class means of igniting student interest and facilitating retention of key concepts and of elements of MSK anatomy.

Under the guidance of my faculty sponsor, Dr. Jacqueline Carnegie, the assignment was given to plan and create interactive videos and/or in-class activities that would encourage the students through 3-D animations and problem solving to apply and integrate their learning of skeleton, joints, and muscles, utilizing clinical cases of simple common injuries. Students would complete the questions in class and then discuss the illustrated answers that are provided.

Methodology

The journey began with narrowing the scope of the project to three main topics to be addressed: the carpal bones, the knee joint, and the hamstrings (corresponding to the skeletal system, joints, and muscular system, respectively). A review of the course objectives and the target goals for each activity was then completed.

1. The Carpal Bones

The first video, on the topic of he carpal bones, was created using Windows Movie Maker. Many resources were utilized, including, online materials, the medical anatomy lab, and an existing x-ray, in addition to enlisting the volunteer assistance of a friend to portray the clinical example of a patient who had fallen on an outstretched hand and fractured her left scaphoid and distal radius bones (a common injury).

Topics encompassed in this video included a general understanding of the upper limb, anatomical position (and the ventral vs. dorsal views of the hand), the 8 carpal bones (focusing on the scaphoid and the lunate that articulate with radius), the metacarpals, and the phalanges, through 3-D illustrations and videos of anatomical structure. The presentation also offered the students opportunities to assimilate and exercise their learning through problem solving questions, strengthening the relevance of their learning.

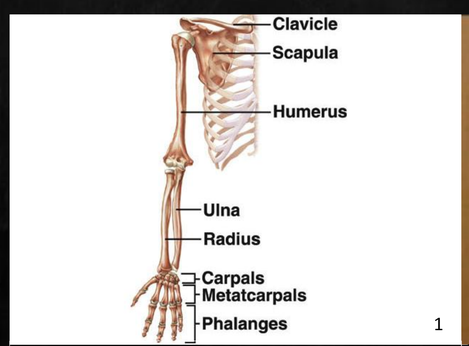


Figure 1: The right upper limb in anatomical position

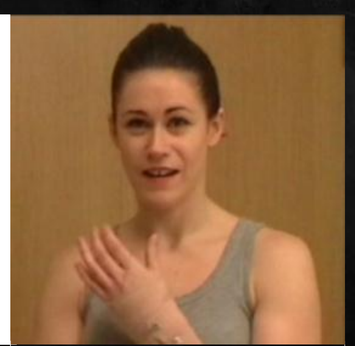
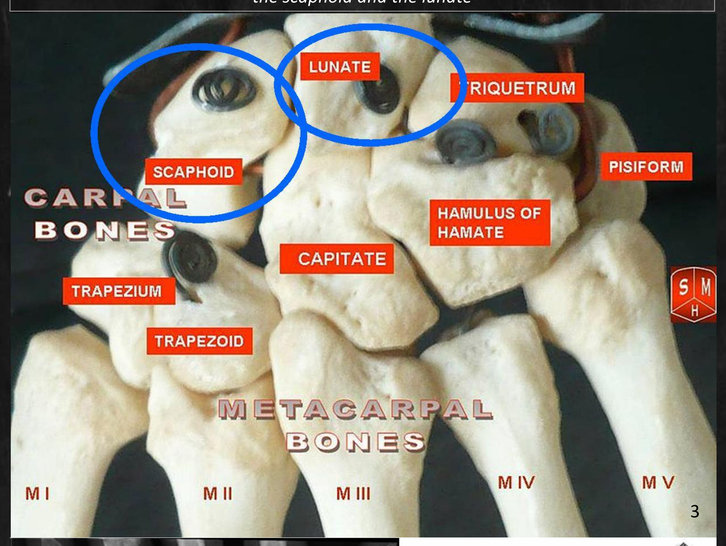
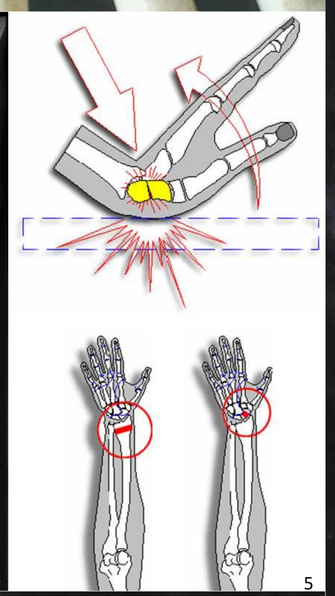


Figure 2: Nursing student, Lisa Young, playing the role of an injured patient

Figure 3: There are eight carpal (wrist) bones, two of which articulate with the radius, the scaphoid and the lunate





Figures 4 and 5: The fracture of the left distal radius and scaphoid bones, a common injury resulting from falling on an outstretched hand

2. The Knee Joint

The second assignment was to create a presentation to cover the knee joint, including the main ligaments and menisci. Utilizing a model of knee joint (borrowed from the Faculty of Medicine), a short video was created to give interactive view of this difficult-to-visualize anatomy. In addition, a PowerPoint presentation was prepared that would allow the students to practice labelling an image with the required components, and to understand the possible consequences of a hockey puck striking the knee from the side.

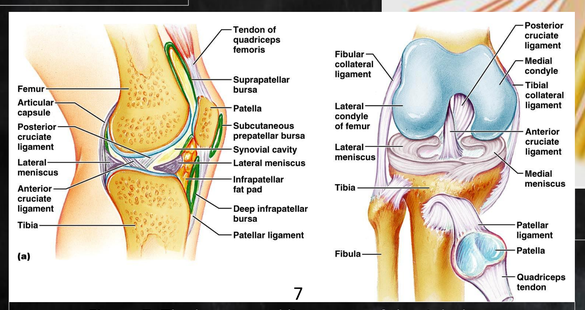


Figure 7: The bursae and ligaments of the right knee

3. Muscle Nomenclature

The third presentation, was designed to assist students in becoming more familiar with long and cumbersome muscle names in the muscular system unit. PowerPoint Hangman was used to create the program in which students were prompted with a muscle description and required to build the respective name of the muscle . The goal was that the students become more comfortable not only with this new vocabulary, but also the correct spelling of the muscle names.

Finally, a short survey was developed to collect the student feedback on the activities.

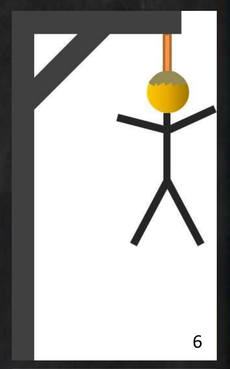


Figure 6: Hangman

Results and conclusions to come…

This project has targeted an ongoing need to develop learning and self-testing tools to support large undergraduate classes. The results of this project will not be fully known until the activities have been used in class and student feedback and grades data have been collected (currently ongoing during the winter term of 2012 by Dr. Carnegie). This project has been submitted for presentation at the Annual Human Anatomy & Physiology Conference (Tulsa, OK) in May, 2012.

Figure 8: The tearing of knee ligaments, a common injury

Acknowledgements

It has been a privilege to work closely with Dr . Jacqueline Carnegie on this project, for which I am extremely grateful . Her passion and enthusiasm for her profession and for refining her teaching approach and techniques to benefit each student are inspirational. I also thank Dr. Ali Jalali (Faculty of Medicine) for providing models to use during the completion of this project and Ms. Shannon Goodwin for helping with video preparation in the Faculty of Medicine anatomy laboratory. Finally I thank Ms. Lisa Young for her enthusiastic participation in the carpel bone video as the injured patient.

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