“It started because of a snow day!” Making Online Videos as Customized Learning Tools

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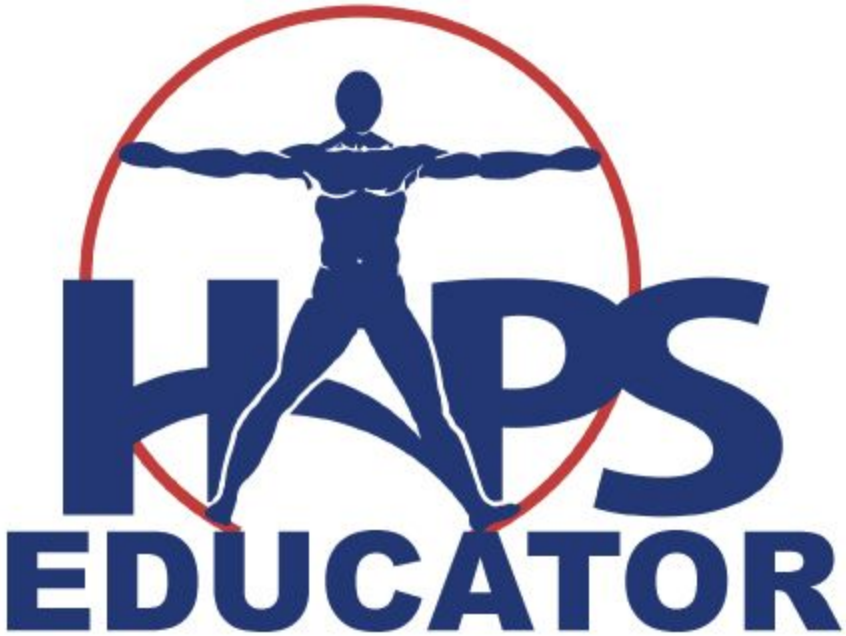

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"It started because of a snow day!" Making Online Videos as Customized Learning Tools

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Abstract
Instructors struggle with the amount of information they are expected to teach in the limited number of hours that are available in undergraduate human anatomy and physiology laboratories and students struggle with how to learn the terminology. When a snowstorm closed our campus, labs were cancelled for five of our fourteen lab sections. The graduate teaching assistants (GTAs) decided to make an online video using our models, presenting the terms for the week. Students who missed labs due to campus closure would be able to watch it in lieu of attending lab and keep up with those whose labs had not been canceled. The video received such positive feedback from students that the next semester, the GTAs produced the "Vanessa Videos" every week and posted them online for every lab section to utilize. The videos provide additional instruction outside of regular laboratory hours so that students can practice anatomy terms whenever it is convenient for them. doi: 10.21692/haps.2018.008

Keywords: use of technology, customized teaching, flipped learning

Introduction
In the first article in this series, we discussed the experience I had when I began teaching human anatomy and physiology at my new university. I met with my graduate student teaching assistants (GTAs) before the semester to ask their opinions on how to improve the lectures and labs (Rudolph and Schwabe 2017). The three GTAs I met with had extensive learning and teaching experience obtained from taking multiple anatomy and physiology courses, teaching many undergraduate laboratories, and working in biology research labs.

One of the GTAs suggested that we make short videos each week covering all the terms for the week, using the actual models we use in lab. The process of how the videos came to be is described in this article. A teacher's guide is included to assist others who are interested in making their own videos.

How it All Began
It was a teaching tool born out of adversity. A lab practical was a week away and the University of Northern Colorado Greeley campus was closed because of snow. Students at the beginning of the week had been able to attend lab but many students had missed lab due to the campus closure.

The graduate teaching assistants put together a video to make the laboratory content available to those students whose labs had been canceled. The video was recorded and posted online, and the link was made available to all anatomy and physiology students. The video featured Vanessa, one of the GTAs, identifying all the bones of the skeletal system. She used the same lab models that would be used for the practical. Two weeks later, after the practical, we received feedback from students indicating that even those who had attended the lab the week of the snow closure used the video as a study tool for the practical.

Anatomy and physiology laboratory is a unique lab experience that relies heavily on the student's ability to memorize terms and apply them to physical models. With the feedback we received from students, the idea occurred to us that more videos could be made for students to access the laboratory information outside of classroom hours when the models are otherwise inaccessible.

Revisiting and Mastering: Videos as an Additional Teaching/Learning Tool
The following school year we decided to record videos for the lab portion of the anatomy and physiology course. Over the course of the semester, GTAs Vanessa and Anna developed a flow and methodology for filming and posting videos through trial and error. Their method ultimately resulted in the ability to produce the best quality videos in the least amount of time.

The best method was recording the videos on a computer, so the computer could be turned towards the presenter and the screen could be adjusted for best visual angle and proximity to the presenter. Depending on how long the video was, it took an average of ten to fifteen minutes to reformat the videos for YouTube and then twenty minutes to upload it onto YouTube.

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Anna used the iMovie application on her MacBook to record videos on her laptop. This hands-free approach allowed her to act as an off-screen assistant who could hand models to Vanessa as necessary.

Decisions: How long should I talk?

Vanessa and Anna decided to break up the terms list into mentally accessible chunks to avoid excessive video length that might prove to be unwieldly for students. Research supports optimal online mini-lecture video lengths of 15 minutes or less (Berg, Brand, Grant, and Zimmerman 2014). Ultimately, our videos ranged from 10 to 25 minutes once the process was optimized.

Additional Benefits: A review/learning tool for new GTAs

The videos were intended for students, but with each semester of anatomy and physiology new GTAs, several of whom have never taken an anatomy course, are directed to the videos as part of their preparation to teach lab. Prior to the availability of the videos for GTA training, it could take up to two hours of meetings per week to train a lab instructor. After the videos were implemented, an unpublished study found that 100% of the new GTAs and 25% of the experienced GTAs reported watching the videos as part of their preparation for labs.

A Snow Day Left More Than Snow Behind

Recording videos of materials to be covered in the laboratory section of an anatomy and physiology course requires time, knowledge, and care. However, the result is a long-lasting tool that allows students and GTAs, novice and experienced alike, to tailor their learning experience to the time frame that best suits them. The following Teacher's Guide explains how we made the videos with some tips to help readers learn from our mistakes. Appendix A includes a list of our videos by topic and a link to those included in the first lab of them as examples.

Teacher's guide

Target audience: High school through college level human anatomy classes. This exercise could be used with any lab where observation of detail and memorization of categories is the objective.

Learning outcomes:
Students should be able to identify and label the terminology assigned for a particular week on the models.
HAPS Fundamental Content and Process Goals 1 and 2:
1. Develop a vocabulary of appropriate terminology to effectively communicate information related to anatomy and physiology.
2. Recognize the anatomical structures and explain the physiological functions of body systems.

Prior knowledge required: Students need to know how to access files on the Learning Management System (LMS). Instructors need to know how to work a video camera and how to edit and upload the video to YouTube.

Time required: The instructor should allot three to four hours to allow for proper setup of the materials to be used, including diagrams that might be required on a whiteboard or a piece of paper. While this might seem like a lot of setup time, keep in mind that the videos, if well done and clear, will be used in several semesters and are well worth the initial time investment. Videos ideally should not exceed 15-20 minutes. If the required materials exceed 15-20 minutes of video time, the instructor should break up the material into multiple videos.

Guidelines for classroom implementation

Make students aware of where the videos can be accessed. The videos are not required material and should not replace lab time. They are to be viewed at the leisure of the student when it is convenient for them. Make the videos available the weekend before the associated lab is to take place. This allows students to be exposed to the materials prior to lab. We now have a document with the video links that is part of the lab orientation packet students receive on the first day of class. We remind them at multiple points throughout the semester that the videos are available and should be used as part of the regular study materials.

Guidelines for design

Instructors must have a clear set of terms or ideas to convey for the video that can be demonstrated in a way that directly correlates with how the student will be tested. For example, at the University of Northern Colorado students are tested in BIO 245 on a specific set of terms with the models that they have used throughout the semester. The videos include identification of structures and terms on the models that will be used for the practical. This material should be presented in an order that makes sense to the instructor.

The instructor may wish to include mnemonics or tips to recall vocabulary and the function or location of each term as it is pointed out on the model. For example "The stapes bone in the ear looks like a staple, or stirrup." If the student must recall the function of the structure being identified be sure to explain its function clearly with a demonstration as necessary. For example, "The *biceps brachii* can be found on the anterior portion of the brachial region (point on model and on one's own arm). The *biceps brachii* aids in flexion at the elbow (flex your own arm to demonstrate this)."

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The UNC anatomy lab does not have a model for the sliding filament theory. As a result, the videos for this topic include diagrams and drawings on a white board. The diagrams are accompanied by a detailed explanation of the physiological process. Although we have no sliding filament model, the students must be able to demonstrate their knowledge of the sliding filament theory on the test. Demonstrating this process using a diagram helps them learn this complex theory.

The instructor who appears in the video must speak clearly, be emphatic, use eye contact with the camera to engage listeners, and be sure that all gestures and parts of the model are in-frame. The instructor should repeat the required words more than once. If the word has a strange spelling the instructor can choose to spell the term out loud and repeat that term.

Instructor observations

It is useful to have a second person available during the making of the videos to hand off models as necessary and to keep the instructor constantly in the frame. Attempting to film one's self requires resetting the camera as the instructor moves and can cause awkward breaks in the video that unnecessarily increases the time it take to make the video. Having the models ready and someone to hand them to the instructor is key to a smooth presentation and keeps the presentation space from being cluttered.

It is helpful to students to clarify during lab time how terms will be indicated on the exam. For example, we use colored dot stickers directly on the models in a central area of the required structure. Since this is how we conduct our exams lab, we demonstrate this in the videos as well, being sure to point out all areas of the structure that are still within the scope of the term. For example, the required information might be that the inner ear includes the cochlea and the vestibule. This could be addressed in a question format, such as "The cochlea is found in which portion of the ear?" Alternatively, it could be addressed in a visual format by placing a dot on the area followed by a question about which portion of the ear is being indicated, such as "Which portion of the ear is indicated by the red dot?"

Conclusion

Videos can be a useful learning and teaching aid for students and instructors. It is not always possible to spend as much time with each student as students may want or need, so videos are an excellent bonus resource. Videos provide extra study time and a means to take the lab models (and a teaching assistant!) home to study independently. That is how the "Vanessa Videos" evolved from a snowy day in January!

The third article of this series will present data from surveys conducted in our labs in the spring 2018 semester. These surveys provide valuable information about how students perceive the effectiveness of changes we have made to the labs. We will look for correlations between grades and learning opportunities the students are participating in. Stay tuned!

About the Authors

Heather Rudolph is a postdoc who is passionate about teaching Anatomy and Physiology. She draws from both active and applied learning techniques in order to connect the formal classroom environment to real life experiences.

Anna Schwabe is a biology education doctoral candidate and certified scientific botanical illustrator. Her teaching expertise lies in maximizing student learning while fostering a teaching environment conducive to novice student instructors in Anatomy and Physiology labs.

Vanessa Johnson is a Master's candidate who specializes in neurobiology and has developed an affection for anatomy and physiology education. She aims to transfer her own passion for biology to her students.

All authors contributed equally to this study.

Literature cited:

Berg, R, Brand A, Grant J, and Zimmerman T (2014) Leveraging Recorded Mini-Lectures to Increase Student Learning. *Online Classroom* 14(2): 5-8.

Rudolph, HA and Schwabe, A (2017) "Yes! Use your cell phones!" Active Learning with Technology in an Anatomy and Physiology Tissue and Integumentary Lab. *HAPS Educator* 21(3): 75-79.

Appendix A

Lab 1
Regions of the body ..... https://youtu.be/60uQTLg_TY8
Body Movements https://youtu.be/FJe0U6GnID8
Planes..... https://youtu.be/zqr3xeTie0w
Body Orientation https://youtu.be/Upj3ewc1sSs
Body Cavities..... https://youtu.be/sCcBPrZwzTk
Microscope ..... https://youtu.be/GFFNAKTdqCI
The Cell..... https://youtu.be/yIWeo5vxFKg

Lab 2
Connective Tissue Flowchart
Tissue Slides: Part 1
Tissue Slides: Part 2
Integument

Lab 3 and 4
Bone Microscopy
Axial and Appendicular Skeleton

Lab 5 and 6
Excitation Contraction Coupling Video
Muscle cell
Sliding Filament Theory Part 1
Sliding Filament Theory Part 2
Muscles of the Head and Neck
Muscles of the torso
Muscles of the upper limb
Muscles of the lower limb

Lab 7
Nervous Tissue
Spinal Cord Stuff
Spinal Cord
BRAINS!!!!
Cranial Nerves
Eyeball video
Ear Video
Olfaction and Gustation

Lab 8
Heart and Pulse
Heart Parts

Lab 9
Arteries
Blood Typing
Blood
Blood Vessels

Lab 10
Lower Digestive
Upper Digestive
Urinary and Kidneys

Lab 11
Respiration
Lung Volumes
Reproduction: Female
Reproduction: Male