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ASYNCHRONOUS VIDEO CONTENT FOR HUMAN ANATOMY & PHYSIOLOGY: IN COORDINANCE WITH A GLOBAL SHIFT TO ONLINE EDUCATION

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ASYNCHRONOUS VIDEO CONTENT FOR
HUMAN ANATOMY & PHYSIOLOGY:
IN COORDINANCE WITH A GLOBAL
SHIFT TO ONLINE EDUCATION

by

HAILEY PHILLIPS

Presented to the Faculty of the Honors College of
The University of Texas at Arlington in Partial Fulfillment
of the Requirements
for the Degree of

HONORS BACHELOR OF SCIENCE IN BIOLOGY

THE UNIVERSITY OF TEXAS AT ARLINGTON

May 2021

ACKNOWLEDGMENTS

I cannot complete this project without first recognizing all of those who became my mentors over the years. My closest mentor, Dr. Pollock, has been nothing short of an exceptional role model. I am beyond grateful to have been enrolled in enrolled Dr. Pollock's Human Physiology course during the Spring 2020 pandemic E-education switch. Despite the many inevitable obstacles, Dr. Pollock, persevered and continued to invest time to ensure his virtual students had the tools to succeed. When I view this file many years in the future, I will remember Dr. Pollock's course and the many amazing professors who shaped my understanding of the world. I would also like to thank Angel Villa who helped me become an Adobe Premiere Pro pro.

May 23, 2021

ABSTRACT

ASYNCHRONOUS VIDEO CONTENT FOR HUMAN ANATOMY & PHYSIOLOGY: IN COORDINANCE WITH A GLOBAL SHIFT TO ONLINE EDUCATION

Hailey Phillips, B.S. Biology

The University of Texas at Arlington, 2021

Faculty Mentor: Nicholas Pollock

Working, short-term, and long-term memory are three of the essential brain functioning required to understand and master new material, whether online or in-person. My project is constructed to supplement Dr. Pollocks Anatomy & Physiology lecture for additional online reinforcement or independent study. The videos I have created strike the correct cognitive load balance for easy understanding while maintaining learning objectives. Videos were created via OneNote and additional effects were edited with Adobe Premiere Pro. The narration is recorded separately on a H2n Handy recorder and edited in audacity. The goal is to captivate and educate the viewer on the three assigned subtopics of special senses: Smell/taste, vision, hearing. Educational videos will become an integral

part of our education system and can supplement in person classes or allow any student with a laptop device and access to Wi-Fi an educational opportunity.

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CHAPTER 1

INTRODUCTION

1.1 Unprecedented Educational Shift

Educational opportunities have drastically changed since the COVID-19. Within a year E-education, distance learning, and asynchronous classes has replaced traditional in-classroom settings. For some students, E-education was their first impression of formal school and for others, it has been a dramatic shift that has left not only students, but also teachers, administrators, and the general public with questions on its capabilities in educating our future.

1.2 Objective

I have created three educational videos that will be incorporated within Dr. Nicholas Pollock's Anatomy & Physiology (A&P) and Human Physiology courses for students that either desire outside reinforcement of concepts or require asynchronous learning. I recorded all audio using a Handy2n recorder and used visuals from Dr. Pollocks lectures materials, Elaine Marieb's Human Anatomy & Physiology textbook, and Martini Timmons and Tallitsch's Human Anatomy textbook 8th edition. I used Adobe Premiere Pro to edit the videos.

CHAPTER 2

HISTORICAL IMPORTANCE

2.1 Other Educational Content Initiatives

Incorporating online aspects in formal education has been a high priority in the scramble to educate students while at home. As online components of education become more integrated in our society, educational videos will take precedence over physical textbooks and writing assignments. The convenience, accessibility, and low maintenance physical costs are only a few of the immediate benefits for the issuing institution and the students that utilize educational videos over textbooks (Baragar, 2020).

It is imperative that educators are on par with advances in technology so that students are technologically competent and prepared for their future career. Another often overlooked benefit of educational videos is that they can incorporate components that aren't possible in a physical setting whether that be due to time constraints, geographical limitations, or limited access to laboratory equipment. For example, AP Biology students studying Mendel's theories may benefit from learning from a lab that requires a test-crossing a generation of peas. While it is impractical for the students to spend months raising peas, students can watch a time lapse that condenses the results into the span of 15 minutes. YouTube is by far the most popular platform for educational content. Khan Academy along with many other smaller organizations have dedicated free online content to reach a wider audience. In a 2017 study, surveying 1,503 respondents of Long Beach Unified school district in California, students who used Khan Academy for 30 minutes a week gained 22

additional points on their state math assessment (Learning). Khan Academy's educational videos have been shown to have statistically significant effect on student's math scores (Learning).

Another example can be seen with "Crash Course" starring YouTubers, John and Hank Green. They have created a complete A&P course video series designed to help high schoolers learn challenging material to prepare them for college (Jenkins, 2015). "Crash Course" videos have been viewed over 1.4 billion times since its creation in 2011 (Jenkins, 2015). In combination with similar initiatives like PBS digital studios and many other small independent creators, online education has innovated the way students learn.

2.2 Accessibility

Educational videos allow students to observe real world experiences at any day, time, and location with WiFi. It gives students the flexibility and convenience unlike any in-person experience. Digital learning in the midst of a global pandemic combined with the academic support of mentors, teachers, and instructors, is the most practical alternative to traditional in-classroom settings (Murphy, et al), although this reliance on technology can pose threat to families that have unreliable connection to WiFi (Murphy, et al). Low income families are more likely to have low-connections and thus more likely to face technical difficulties when accessing videos, coursework, etc. This is the major contributor to the education gap (Baragar, 2020).

CHAPTER 3

RELEVANT RESEARCH

Cognitive load, as described by Sweller and his colleagues (1988, 1989, 1994), states that memory has many components. The combination of working, sensory, and long-term memories provide the student with a higher understanding of the topic at hand (Brame, 2015). When making my videos I used proper vocabulary without over saturating the videos with technical terminology or unnecessary jargon. I found that using consistent vocabulary is one of the clearest ways to create cohesive arguments. In the “Olfaction/Gustation” video I created, I consistently referred to the first order receptors as “olfactory receptors” or “gustation receptors” with respect to their assigned system. In the early stages of script writing, I noticed the confusion that would occur if I had used both “receptors” and “sensory cell” to describe the same 1st order cell. Using this terminology would likely increase the cognitive load and make the learning objective more difficult for students to grasp. To put more casually, the key to simple explanations is consistency and minimalism. The less words the viewer must define or recognize as “new terminology” the easier the viewer can understand (Savas, 2018).

The cognitive load theory can be examined in conjunction with three load experiences, intrinsic, germane, and extraneous (Brame, 2015). Intrinsic load refers to the recognition of an item to a previously learned subject, such as a word pair (e.g., red = rojo) (Brame, 2015). Germane load is where active thinking is required to reach an outcome. This can be seen most apparently in compare-and-contrast, inference, and predicting the

curve style of questions. Extraneous load, while not helpful to the learner, is defined as additional information, which may leave the learner confused (Brame, 2015). I incorporated these three memory types and two of the three load types into my video production efforts. It was a main goal of mine to ensure that the learner should be able to clearly identify the subject matter and successfully identify certain structures.

CHAPTER 4

PROJECT CONTENT

4.1 Software

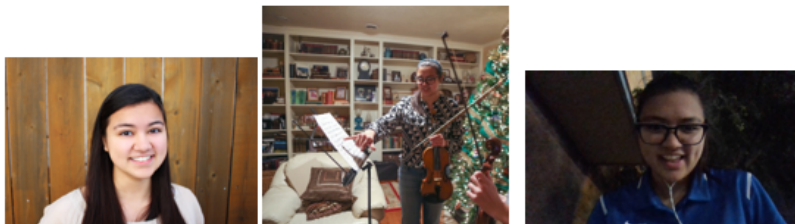
I created three 10- to 15-minute videos teaching important topics discussed in Dr. Pollock's Human Physiology and A&P courses. The most challenging part was learning how to convert files and navigate software. I initially intended to use Imovie as I was vaguely familiar with how to edit videos using it. However, I discovered that Imovie software is no longer available because it was no longer supported on IOS operating systems of the University of Texas at Arlington computers. I decided to use the only editing available software on the computers, Adobe Premiere Pro. While there was a great learning curve, I managed to complete my first video after two days of trial and error.

4.2 Experimental Aspect

To supplement this project and my understanding of how students learn best, I took on an experimental learning component in which I tutored one-on-one with an 11th grade high school student at Arlington High School at Park Row Arlington, Texas. I walk through lessons involving anatomy and physiology and chemistry to not only to better solidify the students understanding of these topics, but also to help me understand what concepts proved to be difficult and what learning techniques are most effective. This student and the student's mother (legal guardian) provided me with full disclosure on my project and have agreed to the terms below (see Figure 1).

Welcome to Hailey's Experimental Honor's Project Tutoring!

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Arlington, TX 76013



This photo was taken before global pandemic

Student Expectations

- Student arrives on time
- Student shows improvement and focus throughout lesson
- Student is prepared with paper and writing utensil
- Student references teacher's resources
- Student has positive attitude toward learning

*If your student needs any accommodations (i.e. chair, ramp, etc) please let me know

HAILEY PHILLIPS IS A RECENT GRADUATE OF UT ARLINGTON MAGNA CUM LAUDE B.S. CURRENTLY COMPLETING HER HONOR PROJECT AND IS CONTINUING HER 4TH YEAR AT UTA. HAILEY IS A MEMBER OF COLLEGE OF SCIENCE DEANS LIST AND IS PRESIDENT OF THE UTA PRE-DENTAL SOCIETY. SHE ALSO TUTOR AP BIOLOGY, GEN & ORGO CHEMISTRY, PHYSICS (MECHANICS), AND ZOOLOGY. SHE ATTENDED ARLINGTON & MARTIN HS WHERE SHE EARNED AP SCHOLAR WITH DISTINCTION. HER PASSION LIES IN LEARNING AND ENJOYS TAKING ON SMALL PROJECTS AND DISTANCE RUNNING.

SESSION OPENINGS:

SESSION TIMES ARE BASED ON BOTH THE TEACHER & STUDENT AVAILABILITY. SCHEDULE CHANGES MUST BE MADE AT LEAST 12 HOURS IN ADVANCE.

OTHER INFO

- HAVING ONE-ON-ONE TEACHING EXPERIENCE WITH YOUR CHILD WILL HELP ME LEARN HOW TO TEACH INTRODUCTORY SCIENCE COURSE MATERIALS
- PUBLIC LOCATIONS (i.e. LIBRARIES, COFFEE HOUSES, etc), ARLINGTON HS PREFERRED
- EXTRA TIME WILL NOT BE GRANTED IF STUDENT IS LATE: SCHEDULING MAY BE SCHEDULED BACK-TO-BACK.
- STUDENT MUST BE WILLING TO GIVE TEACHING FEEDBACK
- YOUR STUDENT WILL NOT BE PHOTOGRAPHED OR RECORDED IN ANY FORM. THIS IS SIMPLY TO HELP ME UNDERSTAND STUDENTS THOUGHT PROCESS AND HELP ME CREATE MORE EASILY UNDERSTANDABLE LEARNING MATERIAL.

I typically ask for the target assignment at least 72 hours in advance, however this is not always needed. I encourage students to attempt subject before asking for help. My goal is to help students help themselves and become life-long learners.]

Figure 4.1: Tutoring Pamphlet Screenshot

I tutored said student, an active 11th grader at Arlington High School, once a week from 30 minutes to an hour. The topics we focused on were those from remediation packets given by his advisor from the previous semester. It was the student's responsibility to complete the remediation packets in order to remain in good UIL academic standing as it

pertains to the “No pass, no play” rule (uiltexas.org). The mother had contacted me directly after what she describes her son “needed more accountability and face-to-face learning”. The topics the student needed most help in was general chemistry.

4.3 Creating the Content

For example, content from in-person classes (i.e. lectures, labs, enrichment activities, etc.) may not coincide with online content as the educational video content was created for a certain audience, expertise level, and purpose. A test-preparation-like video explaining each reaction step, enzyme, and co-factor used during photosynthesis may be designed for students studying for a standardized test. One example of this is the video content created from the channel “Hussain Biology” seen in Figure 4.1.

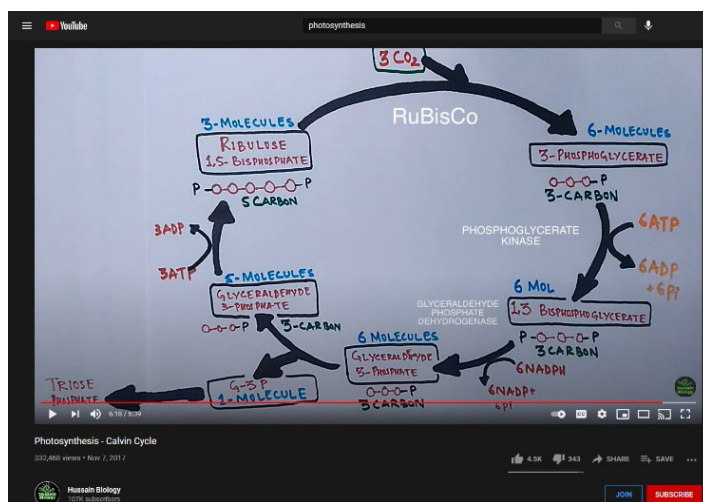


Figure 4.2: Calvin Cycle Pathway Screenshot

If the student in question is seeking to understand only the *difference* in light-independent and light-dependent reactions that take place during photosynthesis, this type of video would be unnecessarily detailed and may leave the viewer frustrated or confused. In my videos for Dr. Pollock’s class I sought to target the right audience, college level

students understanding, to provide as basic explanation and ways to remember that explanation with little effort.

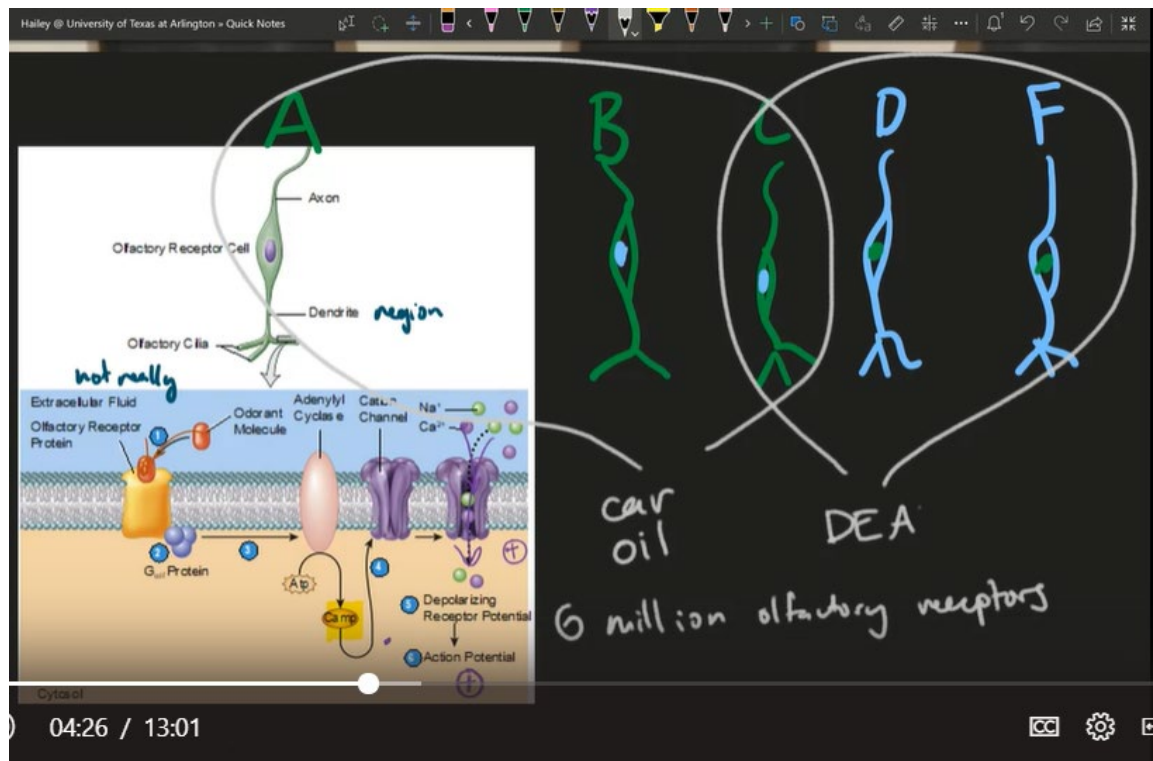


Figure 4.3: Smell and Taste Video Screenshot

4.4 Adapting Learning Styles

As I began understanding the root cause of the student's poor performance, his lack of focused attention, I adapted our study sessions to incorporate goal setting objectives and "brain breaks". Said student was quick to self-correct errors in visual diagrams, images and structure, but had difficulty in assigning correct names to structures, spelling of science related vocabulary, and quickly learned that Having direct feedback and immediate response from said student I can better approach the scripting the video in a clear and understandable manner. Not only that but this student, who agreed to remain anonymous,

experienced a grade increase from 62 to 75 over the seven-month span. I incorporated these concepts and highlighted connections that are helpful for a student learning these topics.

Three important elements I must consider when creating such videos are cognitive load, non-cognitive elements, and active learning features (Hasudungan, 2015). I also will continue to research learning theories as mentioned in this proposal in my spare time as I find the psychology learning very interesting. As it pertains to videos, crafting an appropriate ratio of learning techniques, will help deliver and impactful idea at the video's conclusion. I tried not to overwhelm the viewer with learning tasks. This would increase the working memory capacity. Working memory is the amount to information one can store in a given period, often associated with short term memory (Brame, 2015). Sensory memory refers to the neural stimulation from images, sounds, and diagrams, which is serves as a pre-cursor to short term memory (Brame, 2015). Working memory, with its limited capacity, is selective in what information will be processed in long-term. Long-term memory is encoded to store information for later retrieval (Brame, 2015). The goal is to retain long-term memory of these topics.

4.5 Expected Outcomes Summary

I anticipate future students will view these videos and retain some if not all of the information taught by them because students learn best when they take information in via multiple modalities (Alber, 2019). Reading, listening, drawing, visuals are a few examples of ways they can absorb information (Alber, 2019). While I cannot predict any grade increases in the overall class, I can emphasize that the course is already set up with an abundance of helpful resources. These videos will serve as an upgrade from previous Honors College students video projects. Students can also diversify their learning with any

combination of video and activity booklet resources made during a Honors College contracting project for Dr. Pollock's course, so I do predict that the students that watch these videos will score higher on exams not by causation, but correlation (Learning). I predict this because many of the high scoring students actively seek additional resources to help them fill any gaps in their knowledge (Learning). Those students will likely be the first to watch the videos. These students can then refer other students to the videos. This is simple done when a student asks, "how did you remember that?"

The three videos will be labeled as a series and will help future students learn key concepts and processes with the special senses (i.e., smell, taste, vision, and hearing). These three videos will be used in tandem with Dr. Pollock's lecture materials and will be considered supplemental, as they will not be required, but will be recommended for asynchronous learning.

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BIOGRAPHICAL INFORMATION

Hailey Phillips was born and raised in Arlington, TX. Much of her childhood was spent on the UTA campus, resulting in her decision to also attend UTA for college. Her decision to attend UTA was much influenced by her time participating in summer concerts, fall course physics labs, and spring commencements for friends prior to graduating high school. Additionally, Hailey saw the practicality of living close to home while receiving an exceptional education.

Hailey has had a variety of experiences throughout undergrad including, working as a small start-up, lab tech company Cadmus Dental, working as a data collection assistant at 2M Research, leading the student organization Pre-Dental Society as President, helping out with recruiting with the Honors College Advocates for a semester, attending University of Iowa Summer Dental Program for 6-weeks, and most importantly learning how to become a life-long learner and persevere in difficult times. Other notable achievements that Hailey accomplished in her 4-year undergrad was a completion of a half marathon with a time of 2 hours 15 minutes in Canton, TX and teaching violin to beginner and intermediate students. Hailey plans on taking a gap year in preparation to her next career step, of which is unknown.