CS486C – Senior Capstone Design in Computer Science
Project Description

Project Title: Diversified Anatomy and Physiology Lab Resource App	
Sponsor Information:	Biological Sciences Department DEIJ Committee Members:
	Elise Donovan, elise.donovan@nau.edu
	Sneha Vissa, Sneha.vissa@nau.edu
	Adonna Rometo, adonna.rometo@nau.edu

Project Overview:

Current practices and course materials across STEM fields do not adequately support students of diverse backgrounds to foster learning, personal growth, belonging and retention. Students seeing themselves in their curriculum and course materials is key to alleviating these inadequacies and fostering belonging and success. Our group in biological sciences is currently pursuing several initiatives to deconstruct historical biases in course material and instruction, and pilot initiatives in our core curriculum to increase representation, equity, inclusion, representation and belonging for our

Figure : Example standard anatomy lab model and lab manual cover

underrepresented and historically marginalized students. One specific area in which we are working is our anatomy and physiology lab course materials. Historically, anatomical models and images used to teach students anatomical terms and structures depict white and slender bodied human forms (See figure for examples). Physical models depicting different facial structures, body types, and skin colors are uncommon and the only computer program for teaching anatomy that depicts diverse humans (that we are aware of) comes with a 6 digit price tag.
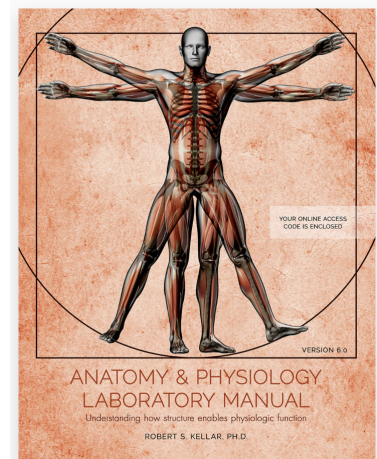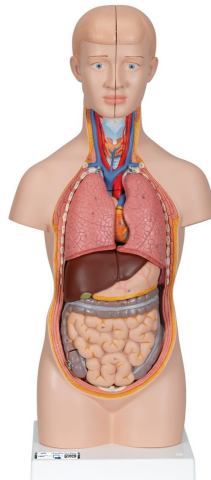
As such, **the purpose of this project** is to develop an application that supplements current BIO 201 anatomy and physiology lab resources. The application would offer students the ability to construct models and images that visually depict different racial identities, body types, and appearances to use for learning and studying the anatomical and structural curriculum, as a resource that compliments the current BIO 201 lab curriculum and materials.

Version: 2022

The minimum viable product

- A web application to supplement the current course material resources for the initial labs in our BIO 201 anatomy and physiology lab curriculum. In this section of the course the students are learning superficial anatomy, body orientation terms, and general tissue classification. In the app, students would be able to open the app, select characteristics of a model human they identify with relative to skin color, features, body type, etc.. These characteristics might be selected using sliders, radio buttons, checkboxes, etc. depending on the specific feature, which would then be used to define the characteristics of the model human that would be displayed to the student in the app.

- At this initial point, the app would present external body surface with the focus being use in learning the key terms and concepts of the lab curriculum built in and serve as a tool to assist in meeting the learning objectives of the lab curriculum.

- In the first iteration of the product a key component that needs to be displayed by the model is the integumentary system (skin). Students would be able to visualize how different components of the skin look with different skin colors, and how different pathologies appear differently on/in different skin tones. This may include images, terms, and structures from current course materials being integrated into the app in a way the students can apply them regardless of what identity features they choose for their model.

- Additionally, the user might play with the characteristics of the body, to see the change they made applied to the model. This may require interesting approaches related to visualization, or AI techniques and methods to recreate the shape of the body after each characteristic is changed. For example, if one changes the amount of abdominal fat or the bust size, the model needs to be rebuilt to make the parts of the body show in a realistic form given these constraints

- Lastly, it is key to this project to develop a well-architected application, which may be extended in the future. The application must be flexible, easy to maintain and extend to include other layers (muscular system, vascular system) and body movements in future releases.

- **Stretch goals**

  - Build the application out to include additional body systems that are covered as the curriculum progresses. The students would be able to create their human then peel layers off and use it to study the anatomical structures underneath. In BIO 201 this includes tissues, the skeletal system, articulations, musculature, the brain and cranial nerves, and the sensory systems. Additional systems would be a further stretch goal.

Knowledge, skills and expertise required for this project:

- An understanding of mobile software development

- Ability to create a flexible and extensible program design to enable future expansion of the product.
- Knowledge/interest in dealing with graphical/interactive visual design.
- Literacy in Diversity, Equity and Inclusion (DEI).
- Desirable: interest in anatomy/biology.

Equipment requirements:

- Development platform and software/tools in accordance with the needs

Software and other deliverables:

- A robust beta of the application running, tested, and functional.

- A strong as-built report detailing the design and implementation of the product in a complete, clear, and professional manner. This document must provide strong support for extending the product.

- Complete professionally-documented codebase, delivered both as a repository in GitHub, BitBucket, or some other version control repository; and as a physical archive on a USB drive.

- A complete and thorough User Manual with instructions about how to install, set up, and implement the program.