2019 Technology Fee – Full Proposal

Title: 21st Century 3D Tools to Learn and Teach Anatomy

Proposers: Health Science Center Libraries Digital Health Technology Team (Sarah Meyer, Matthew Daley, Mary Edwards, Hannah Norton, Ariel Pomputius)

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Sponsoring Organization: George A. Smathers Libraries

Purpose and Specific Objectives:
The George A. Smathers Libraries requests $163,137 to purchase three-dimensional (3D) visualization and examination tools to enhance students' learning experience in anatomy. Anatomy is a foundational area of knowledge across life science disciplines and UF requires anatomy courses for numerous undergraduate, graduate, and professional degree programs. Studies indicate the use of 3D anatomical visualization, when compared to other techniques, results in improvements in factual knowledge andspatial knowledge acquisition.[1] These funds will be used to purchase 1) a one-time license to Primal Pictures online anatomy software, and 2) one Anatomage© virtual dissection table.

Primal Pictures (https://primalpictures.com/primal/the_primal_story/index.html) is a web-based 3D anatomy software. This software will provide students in departments and colleges across campus studying human anatomy with access to a powerful anatomical suite of 3D computer images, MRI scans, cadaver dissection slides, pathology specimens, and educational videos in an accessible online environment. Primal Pictures software is one of the rare anatomy resources to include a suite of dental visualizations, which will be a key resource for the students in UF's College of Dentistry.

Primal Pictures.com

The Anatomage Table 6 (https://www.youtube.com/watch?v=F9MQURbmhfs) is a 3D virtual dissection system which includes human and animal models. The Anatomage table is described as the most technologically advanced visualization system for virtual dissection system anatomy education and has been broadly-adopted by many of the world's leading medical schools and institutions.

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[1] Yammine, K. & Violato, C. (2014) A meta-analysis if the educational effectiveness of three-dimensional visualization technologies in teaching anatomy. *Anat Sci Educ.* Doi:10.1002/ase.1510
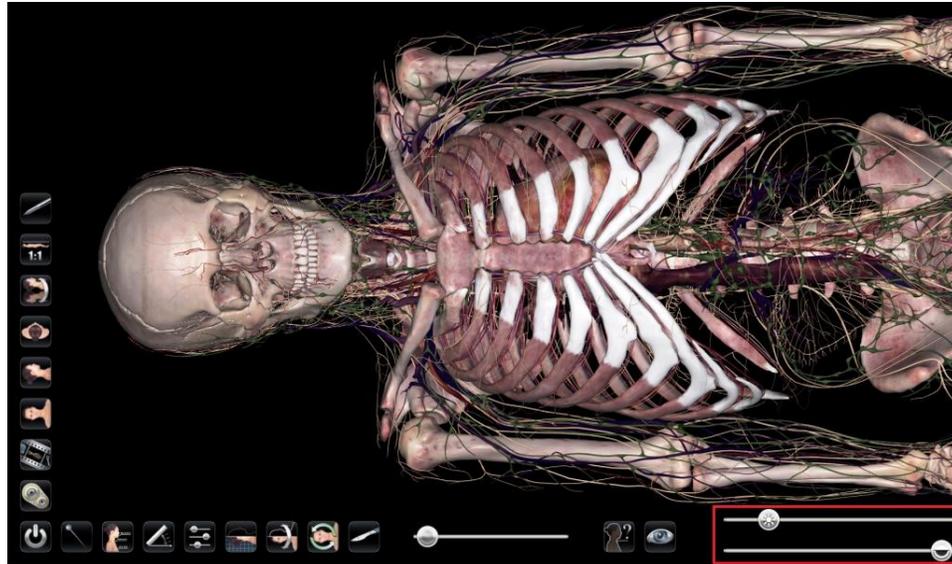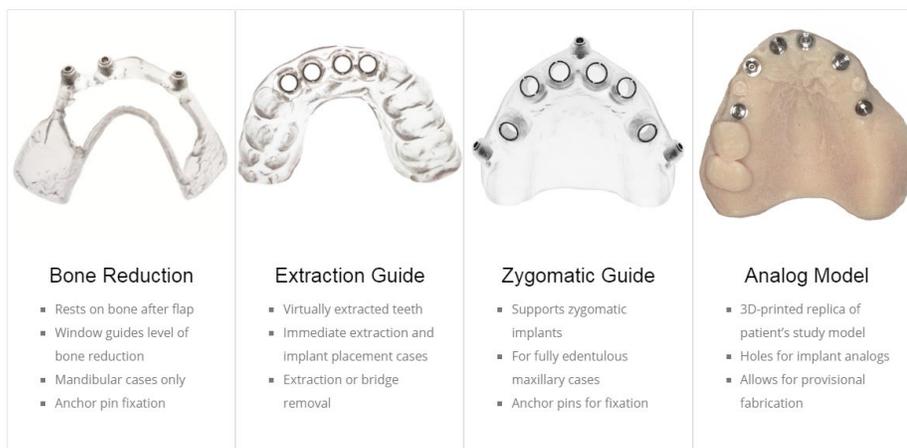
Anatomage.com

The Anatomage table will be housed in a public learning space on UF's campus – the Health Science Center Library (HSCL). Six health science colleges (Dentistry, Medicine, Nursing, Pharmacy, Public Health & Health Professions, and Veterinary Medicine) are located in the Health Science Center (HSC). The HSCL serves this population of over 12,000 undergraduate, graduate and professional students, residents, faculty and the entirety of the campus community, with about 400,000 visits per year. The device, modeled after an operating room table, is on wheels making it possible to utilize it in two highly accessible areas of the HSCL, although it will primarily be located on the first floor within sight of the main HSCL doors. The Anatomage table will be available for use in the HSCL's new Biomedical Information Teaching Space (BITS) to integrate the power of 3D anatomy images into courses to enhance anatomy learning experiences. BITS is a new, state-of-the-art teaching facility equipped with 50 computer workstations, two large projector displays, and four Airmedia-capable large-screen monitors. The BITS space is accessible across UF to all students and faculty. The device interfaces with Airmedia to display images on the large-screen monitors in BITS to provide innovative anatomy teaching opportunities. The workstation computer connected to the Anatomage will include specialized "Medical Design" software to expand the use of the Anatomage programs. Users will be able to reserve the Anatomage table through an online reservation system. This system is identical to the one used to reserve study rooms. The Primal Pictures database will be accessible online via gator link logon similar to other library databases.

Housing the Anatomage table in the HSCL ensures access by all students and faculty without the restrictions that occur when this type of innovative device is held in a single academic department. For instance, the College of Medicine (COM) has a similar virtual dissection table that is kept behind a locked door and only accessible by COM students. The purchase of this table will ensure that the thousands of students in the 49 anatomy courses offered across 18 departments have equitable access to the 3D educational possibilities of these anatomy resources. Both of the proposed locations in the HSCL are accessible weekdays from 7am-11:30pm and on weekends.

Impact/Benefits:

The project team anticipates students and faculty will use this technology to:

- Dissect and evaluate complex anatomical structures using high-quality 3D renderings

- Access thousands of annotated structures demonstrating the variation in anatomical structures in both animals and humans

- Utilize special "Medical Design" software to print custom 3D anatomical objects using the Libraries' 3D Print Services

Bone Reduction	Extraction Guide	Zygomatic Guide	Analog Model
▪ Rests on bone after flap ▪ Window guides level of bone reduction ▪ Mandibular cases only ▪ Anchor pin fixation	▪ Virtually extracted teeth ▪ Immediate extraction and implant placement cases ▪ Extraction or bridge removal	▪ Supports zygomatic implants ▪ For fully edentulous maxillary cases ▪ Anchor pins for fixation	▪ 3D-printed replica of patient's study model ▪ Holes for implant analogs ▪ Allows for provisional fabrication

Example of 3D objects printed with Medical Design software Anatomage.com

The following solicited statement from Dr. Kyle Rarey, anatomy professor and winner of multiple teaching awards, describes the student impact of this proposal: "*As a senior anatomist and medical educator, I have witnessed the incorporation of new educational technologies to assist students (Medical, Dental, and Physician-Assistant) in learning the anatomy of the human body. While I am an advocate of cadaver-based dissection by our health science students, I have also been very proactive in using 2D and 3D software anatomical programs to enhance students' anatomical learning, as well as their retention and recall. From my teaching experience, students will enthusiastically utilize the proposed state-of-the-art resources.*" Additionally, Sara Weitzel, Associate Director, HSC Educational Technologies had the following comment about the impact of this proposal for students: *"The HSCL proposal could benefit students by providing a space to use 3D anatomy tools like the virtual dissection table and learn at their own pace."*

Sustainability:

A one-time license to purchase Primal Pictures ensures this resource will be available for current and future students enrolled in anatomy courses at UF. There are no recurring costs associated with this one-time purchase. The Health Science Center Library has committed to cover recurring maintenance costs, extended warranty agreement with an annum cost range from $8,160 to $18,360, and any infrastructure upgrades needed such as port drops/activation for the Anatomage Table.

Timeline:

Time	Activities
Receipt of funds : August 2019	- Purchase Primal Pictures and Anatomage Table - Coordinate with Library Facilities and IT to identify any power or network needs
September 2019	- Coordinate with Acquisitions & Collections and IT to add Primal Pictures into all library web-based catalogs - Develop marketing and training materials - Coordinate with IT, Facilities, and vendor to map out an installation schedule
September 2019-Febraury 2020	- Install Anatomage Table - Train library staff and faculty of anatomy courses across UF on use of Primal Picture and Anatomage Table - Outreach and promotion to students, staff, and faculty - Development of Library Workshops on using 3D anatomy resources