UNIVERSITY OF LOUISIANA AT LAFAYETTE

STEP Committee

Technology Fee Application

Virtual Cadaver Dissection Table and Wireless Access Improvement for The Anatomy & Physiology Teaching Laboratory

Title

Brandon Waltz, Michael Fulbright, William Schmidt, Sophie Plouviez, Sherry Krayesky-Self

Name of Submitter
(Faculty or Staff Only)

Department of Biology

Organization

Title: Virtual Cadaver Dissection Table and Wireless Access Improvement for The Anatomy & Physiology Teaching Laboratory

Date: 7-2-2021

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ABSTRACT (250 words or less):

Anatomy and physiology are the core components of any healthcare-based curriculum. Not only is healthcare a critically important and necessary component of a functioning society, we have recently witnessed a global crisis and shortage of healthcare professionals. Around 1,300 students enroll specifically in ULL A&P courses *each year*; majors include nursing, kinesiology, HIM, pre-dental assistant, and biology (including pre-med/pre-vet students). Instructional technology has evolved greatly in recent years, yet the A&P labs remain outdated. The A&P teaching lab in Billeaud Hall has seen little structural or technological change in decades and is in dire need of technological upgrade. Funding allocated towards bettering the instruction of such a crucial series of courses would be an investment incredibly well spent; without cadaver specimens, the human A&P labs largely lack the human component. Adding cutting-edge technology to our laboratory will boost student morale and instructional integrity. The use of virtual dissection tables, along with access to current shareware and digital pedagogy will ensure that the education experience of all A&P students meets the highest standards and practices. The virtual dissection table is an immediate need and is imperative to uphold the UL reputation for excellence in the biological, medical, and allied health fields. In addition, the A&P teaching labs are regularly utilized for recruitment events like Preview Day, Science Day, and Science Olympiad. When visiting, prospective students would see virtual life-size cadavers and 3D structures brought to life at their fingertips - modern equipment that will prepare them for modern employment.

a. Purpose of grant and impact to student body as a whole

The purpose of this grant is to provide the thousands of Biology, HIM, Kinesiology, Nursing, Pre-Dental Assistant, and Pre-Med students (from multiple colleges and departments including Engineering, Chemistry, etc.) taking BIOL 221 and 318 (Survey of Human Anatomy and Physiology and Advanced Human Anatomy and Physiology, respectively) courses access to digital human cadavers through implementation of an Anatomage virtual dissection table. The Anatomage virtual dissection table has been implemented by leading medical schools and other institutions across the world. Providing hands-on virtual cadaver activities of systems and structures, pathologies, and injuries is vital to such core medical/healthcare courses and will be as close as our institution can get to having real cadaver lab access. This technology has the potential to shift our A&P labs from the archaic structuring of model usage and animal-based dissections to more technologically-advanced, human-oriented courses, which can instead be supplemented by models and some animal/organ dissections. The process of converting an outdated lab to a more technologically-oriented lab requires upgrades to essential requirements

for that technology to function, such as internet connection (Wi-Fi). The addition of a wireless access point in Billeaud 123 will ensure internet stability and reliability for courses relying on internet for their learning experiences. Additionally, as mentioned in the abstract, student recruitment will likely be boosted from this new technology.

b. Projected lifetime of enhancement

The lifespan of the Anatomage virtual dissection table is estimated to be ~25 years, which is longer than most of the equipment employed in the A&P labs. The table will receive constant technical support and software upgrades for as long as we own the table. The main component that will likely need to be replaced in the future is the system's graphics card (averaging ~$750); Anatomage technical support has mentioned this will likely not be a concern for roughly 10 years, after which departmental funds can be utilized for replacement. Additionally, as this system is essentially a large computer system, we were informed most repairs (if needed) are relatively minor/simple fixes. We anticipate the lifespan of the wireless access point to be approximately five years.

c. Person(s) responsible for

i. Implementation

The person responsible for implementation will be Brandon Waltz and Michael Fulbright, instructors and lab coordinators of Anatomy and Physiology.

ii. Installation

Anatomage technical support and installation employees will be responsible for the installation of the equipment. The virtual dissection table will be housed in Billeaud Hall, primarily in room 123, but can be transported to nearby classrooms if needed. The table runs on standard electrical output from standard electrical outlets. University of Louisiana at Lafayette IT Department will assist in installing the wireless access point.

iii. Maintenance

Maintenance will be conducted by the Anatomage IT/technical support team and coordinated with Brandon Waltz, instructor and lab coordinator of Anatomy and Physiology. University of Louisiana at Lafayette IT Department will assist in maintenance of the wireless access point.

iv. Operation

Course instructors take full responsibility for the care of the dissection table and are responsible for learning the software and operational functions of the dissection table. Instructors are also responsible for aiding teaching assistants in learning the software and operational functions. Students will also be able to conduct hands-on activities with the dissection table, under the supervision of and after initial interface briefings by teaching assistants or instructors. Once set up, the wireless access point should operate/function automatically.

v. Training (with qualifications)

Anatomage provides complimentary training for use of the dissection table. Instructors and teaching assistants who will be using the table will have the opportunity to attend these sessions. If faculty or teaching assistants cannot attend an Anatomage-hosted training session, Brandon

Waltz, Michael Fulbright, and other trained faculty members are responsible for providing training. The wireless access point requires no training.

d. Narrative - purpose and justification for each of the items listed in the Budget Proposal.

i. Equipment

1. Anatomage Virtual Dissection Table

a. Purpose

The Anatomage virtual dissection table would provide a hands-on approach to human anatomy and physiology. The virtual dissection table will function to improve student interest, engagement, and performance, in addition to improving student recruitment. The Anatomage table would be of use primarily to the BIOL 221 and 318 laboratories in Billeaud 123, but also available for use in the BIOL 216 and 217 online and hybrid courses (when not in use by the BIOL 221 and 318 courses).

b. Justification

The Anatomage virtual dissection table allows students to see the human body in more ways than real cadavers can allow for. With a few menu selections and strokes of the finger, students can locate the diaphragm, identify its blood supply, and visualize the neural motor pathways innervating the muscle, starting from the autonomic respiratory groups. Students can then learn about the clinical significance of pathologies/functional impairment of these structures. Students will also be able to engage in activities comparing structures across the four digitized cadaver specimens included with the table, teaching the important concept of human variation – something we cannot adequately teach with models and animal dissections. Furthermore, using a virtual dissection table removes the need to use real cadavers, the cost of which would outpace the longevity of the virtual dissection table (in addition to the requirement of storage facilities, which would require expensive building renovations/remodeling).

Instructing A&P courses involves many challenges; a primary one involves the illustration and explanation of complex three-dimensional structures to students. Many instructors utilize white boards, PowerPoints with images, etc.; however, none of those options compares to the ability of virtual dissection tables to dissect, zoom in/out, and rotate three-dimensional structures digitized from real humans. The virtual dissection table allows for the visualization of all tissue types in their natural position without modification for simplicity – something most other three-dimensional A&P software applications employ. Of course, the table does allow for dissection and isolation of individual components as well.

This technology is planned on being implemented alongside virtual/digital courseware such as Visible Body. This ensures that after learning on the new virtual dissection table platform, students can review and supplement their knowledge at home/away from the teaching lab, when there is no access to the dissection table.

As mentioned above, the recruitment potential arising from acquiring a virtual dissection table is great. Many prospective students have passed through the A&P teaching lab during Preview Day, Science Day, and Science Olympiad events. Currently we can only display models and dissected

animal specimens, showing our lack of technology and laboratory enhancement. It is difficult recruiting students while our A&P labs have less technology than some high school teaching labs. Having a virtual dissection table would elevate our A&P labs towards state-of-the-art status, making the decision to enroll much easier for prospective students. This is especially important given the large enrollment of the A&P courses.

It is important to acknowledge the recent funding of an Anatomage virtual dissection table to the School of Kinesiology. Though these tables contain the same built-in functionality, there would be no overlap in course-specific usage (i.e. our A&P courses would not have the needed access to the Kinesiology dissection table). Our A&P labs (~25 sections) run the length of each day, Monday through Thursday, typically from 8:00 am to 6:00 pm, with some sections in session at later times and Friday mornings. Therefore, with such demand, our lab requires a virtual dissection table solely dedicated to the A&P courses. With courses consisting of this large of a student population from all the different represented majors listed above (across multiple departments), adding a virtual dissection table would be incredibly beneficial and worthwhile. Our anatomy and physiology courses are large, impactful, and too foundational to all medical and allied health concentrations to be left behind, technologically.

2. Wireless Access Point

a. Purpose

The purpose of the wireless access point is to provide a reliable Wi-Fi signal for all students using the Wi-Fi-enabled technology in BLD 123.

b. Justification

As we work towards improving the A&P teaching lab, we are incorporating new technologies that require and rely on stable internet connections. The Wi-Fi connection throughout Billeaud Hall can be unstable at times, creating the potential for inconsistent student learning experiences. The A&P labs are moving towards using digital/virtual courseware such as Visible Body to supplement the Anatomage dissection table; one main component uses web-based software to visualize complex three-dimensional structures and view physiological processes – this requires stable internet connection.

ii. Software

Software updates are provided at no cost while we own the Anatomage table. Updates to the wireless access point will be at no cost.

iii. Supplies

No supplies are required for the acquisition and installation of the Anatomage table and wireless access point.

iv. Maintenance

Tech support and routine maintenance is provided at no cost for the Anatomage table. Components needing to be replaced would introduce cost. The anticipated replacement needed includes the graphics card, which will likely need to be replaced every ~10 years. This involves no initial cost with the purchase of the Anatomage table but can be covered by departmental

funds. There is no anticipated maintenance required for the wireless access point.

a. Purpose

The software requires a graphics card to display content and function properly. More intensive functions require a more powerful graphics card.

b. Justification

As software updates and upgrades, eventually, it may exceed the original requirements of the graphics card. A new graphics card will need to be purchased approximately every ~10 years, with the current price averaging ~$750.

v. **Personnel**

No personnel costs are associated with the acquisition and installation of the Anatomage virtual dissection table and wireless access point.

vi. **Other**

There are no other costs associated with the acquisition and installation of the Anatomage virtual dissection table and wireless access point.

Budget Proposal

1.	**Equipment**	**$ 82,485.76 (Anatomage table + wireless access point)**
2.	**Software**	**$ 0**
3.	**Supplies**	**$ 0**
4.	**Maintenance**	**$ 0**
5.	**Personnel**	**$ 0**
6.	**Other**	**$ 0**
TOTAL:		**$ 82,485.76**

Additional Information:

1. This proposal is planned to be one in a series to improve the technology in Billeaud 123. Currently, the only student-accessible technology in the A&P teaching lab includes compound microscopes, six Dell laptops (over four years old) and six iWorx physiology kits. Typical lab sections consist of 24 total students. Therefore, in addition to the virtual dissection table, the teaching lab is in need of
    a. Tablets/computers for each student to work with physiology kits and the

virtual/digital courseware that will become our new course platform. The lab tables in Billeaud 123 would need to be updated to include built-in outlets, as the current student-accessible outlets are on the floor under each table and regularly require maintenance – not suitable for use of expensive equipment.

b. Digital compound microscopes capable of taking and storing images, to aid in student assessment, learning, and review of materials.
c. Additional physiology iWorx kits to accommodate more tables, allowing for more student engagement and involvement during physiology exercises/experiments.

2. Summary of a case study conducted by Paech et al. (see reference below) finding that Anatomage virtual dissection tables increased student anatomy performance by up to 27%; attached to this document.
   Reference: Paech, D., Giesel, F., Unterhinninghofen, R., Schlemmer, H., Kuner, T., & Doll, S. (2016). *Cadaver-specific CT scans visualized at the dissection table combined with virtual dissection tables improve learning performance in general gross anatomy*. [Abstract]. European Radiology, 25(9). doi:10.1007/s00330-016-4554-5.
3. Anatomage quote for virtual dissection table; attached to this document.
4. Solid IT Networks quote for a wireless access point; attached to this document.

Previous Funded STEP Projects:

2021: STEP Grant: *Idea Board & Audio Visual (AV) Equipment for Undergraduate Teaching Laboratories in the Department of Biology*: $31,878.70 (BLD113 and VLW416, Sophie Plouviez, Sherry Krayesky-Self, William Schmidt, & Ritwij Kulkarni)

2018: STEP Grant: *Upgrading an Autoclave for Student Research in Biology.* $19,250 (Yi-Hong Wang and Sherry Krayesky-Self)

2017: STEP Grant: *Upgrading a Molecular Biology Teaching Lab*: $29,392.20 (replacing old molecular equipment in Wharton 416, Yi-Hong Wang & Sophie Plouviez)

2017: STEP Grant: *Compound Microscopes for Teaching Laboratories in the Department of Biology*: $126,973.27 (Sherry Krayesky-Self, William Schmidt, Paul Leberg)

2016: STEP Grant: *Specialized research equipment is required for undergraduate research activity in marine biology (phycology/marine botany)*: $34,675.00 (Sherry Krayesky-Self and William Schmidt)

2006: STEP Grant: *Stereomicroscopes (Dissecting microscopes) for upper and lower division student laboratories in the Biology Department*: $181,253.40 (Sherry Krayesky-Self)

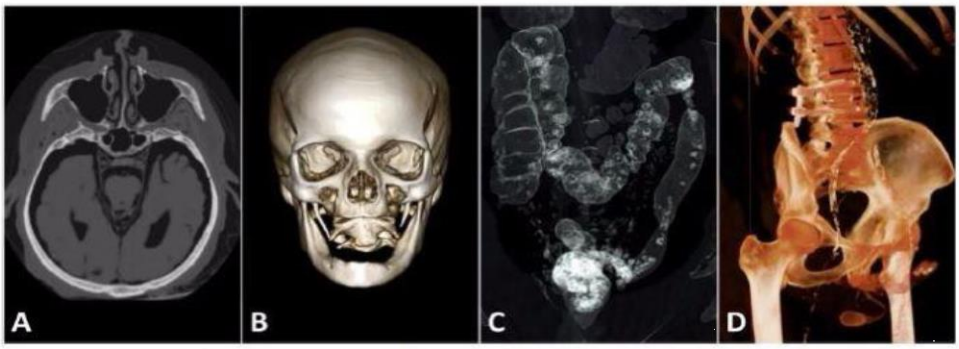
2006: STEP Grant*: Computers required for Biology Study Room-Computer Lab*: $8,744.00 (Sherry Krayesky-Self)

2005: STEP Grant: *Technological Enhancement of the Biology Freshman/Sophomore Laboratories*: $80,899.00 (complete remodeling of laboratory room 115 in Billeaud hall, Sherry Krayesky-Self)

Anatomage Table Increased Student Anatomy Scores By Up To 27%

Measuring Learning Success In First-Year Gross Anatomy

Researchers from the University of Heidelberg, German Cancer Research Center, and Karlsruhe Institute of Technology recently published research focusing on the impact of the Anatomage Table. It was designed to measure the qualitative and quantitative success of radiologic imaging and 3D visualization in first-year gross anatomy courses at the University of Heidelberg Medical School.



Evaluation Of Virtual Technology In Courses

The 2 courses focused on were the Heidelberg Curriculum (HeiCuMed) of gross anatomy and another radiologic anatomy (RA) seminar. The HeiCuMed course is a more conventional anatomy course while the RA seminar used radiologic imaging such as CT scans and X-rays to teach gross anatomy. There were 3 specific cohorts of students that were evaluated quantitatively through a multiple choice anatomy examination. One group had access to CT workstations, the Table, and extra training in the RA seminar (CT + seminar group). Another group had additional training in the RA seminar course while the last group was only in the conventional anatomy course.

Quantitative & Qualitative Findings Of Cohort Analysis

Overall, the CT + seminar group achieved both higher and statistically significant scores compared to the conventional anatomy and RA seminar group of students. This cohort increased scores by 19.3% and 27.3% respectively when compared to those without CT scan training in the seminar and conventional anatomy course. Significant improvements were also seen when comparing the CT + seminar group to the other two groups with knowledge of the head and neck and extremities. This might be explained by the fact that intra- and extracranial anatomical structures are more complex in structure. Viewing these structures through virtual dissection may have resulted in more complete knowledge retention. Having access to CT cross-sections and virtual dissection tools may have also impacted students' knowledge of extremities and distal structures in the body.

References

Paech, D., Giesel, F., Unterhinninghofen, R., Schlemmer, H., Kuner, T., & Doll, S. (2016). *Cadaver-specific CT scans visualized at the dissection table combined with virtual dissection tables improve learning performance in general gross anatomy.* [Abstract]. European Radiology, 25(9). doi:10.1007/s00330-016-4554-5.

Anatomage

Price Quotation

Anatomage Inc.
3350 Scott Blvd Bldg 29
Santa Clara, CA 95054
www.anatomage.com
info@anatomage.com
(408) 885-1474 Phone
(408) 295-9786 Fax

Prepared By	Jonathan Perry	Created Date	6/25/2021
Email	jperry@anatomage.com	Expiration Date	9/23/2021
		Quote Number	2021-6975

Contact Name	Brandon Waltz
Phone	7123308748
Email	waltz@louisiana.edu

Bill To Name	University of Louisiana at Lafayette	Ship To Name	University of Louisiana at Lafayette
Bill To	400 E St. Mary Blvd. Billeaud Hall Lafayette, Louisiana 70503 United States	Ship To	400 E St. Mary Blvd. Billeaud Hall Lafayette, Louisiana 70503 United States

Product	Line Item Description	Sales Price	Quantity	Total Price
Anatomage Table Convertible		$78,000.00	1.00	$78,000.00
Crate - MTD		$800.00	1.00	$800.00
Anatomage Table Convertible Hardcover		$275.00	1.00	$275.00
Medical Design Studio	Included w/ Table Convertible	$0.00	1.00	$0.00
1st Year Warranty, Software Upgrade, Tech Support	Included w/ Table Convertible	$0.00	1.00	$0.00
Training	Included w/ Table Convertible	$0.00	1.00	$0.00

Total Price	$79,075.00
Shipping and Handling	$2,450.00
Grand Total	$81,525.00

Country of Origin: United States
Place of Manufacture: San Jose, CA
Price does not include taxes and duties associated with importation of the product, which must be paid by Consignee
Quote is only valid in USD

Acceptance

Signature_____ **Date**_____

Solid IT Networks

Contact: Janet Phillips
Phone: 346-229-2434
Email: jphillips@soliditnetworks.com
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Solid Relationships, Solid Solutions

BLD 123 Grant Proposal- NCPA Contract 01-97

Quote #017912

Version 1

Prepared for:

University Of Louisiana At Lafayette

Solid IT Networks

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DATE	NUMBER	VER
06/22/2021	017912	1

PROJECT
BLD 123 Grant Proposal- NCPA Contract 01-97

BLD 123 Grant Proposal

ITEM	DESCRIPTION	LIST	PRICE	QTY	TOTAL
JZ357A	Aruba AP-555 802.11ax 5.95 Gbit/s Wireless Access Point - 2.40 GHz, 5 GHz - MIMO Technology - 2 x Network (RJ-45) - Wall Mountable, Ceiling Mountable, Rail-mountable	$1,990.00	$803.00	1	$803.00
R3J18A	Aruba Mounting Bracket for Wireless Access Point	$35.00	$15.35	1	$15.35
JW471AAE	Aruba Enterprise License Bundle - License - 1 Access Point - Electronic - PC	$300.00	$118.50	1	$118.50
H8FN0E	HPE Foundation Care Software Support - 1 Year - Service - 24 x 7 x 2 Hour - Technical - Electronic Service	$26.00	$23.91	1	$23.91
	BLD 123 Grant Proposal Subtotal				**$960.76**

Quote Totals

SECTION	TOTAL
BLD 123 Grant Proposal	$960.76

Total **$960.76**

Additional Taxes or shipping charges may apply. Payments by credit card will be subject to an additional 4% processing fee. Manufacturer and Distribution warranty, cancellation, and return policies will apply. Please note that pricing data is updated frequently and may change without notice.

Signature _____ Date _____

Solid IT Networks

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Phone: 346-229-2434
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Web: http://www.solidit.com

Note

Due to Covid-19 and pandemic circumstances, product availability and lead times may vary. Also, tariffs on products imported from certain foreign countries may imposed in the future. This may result in higher list prices on affected SKUs. We will be working closely with our networking manufacturers to try to minimize the effect for our customers. Note that we do not have control over product availability, import issues or border delays and this may result in orders being received after tariffs are increased and hence additional costs. We recommend that orders be processed ASAP. If necessary, Solid IT will be issuing revised quotes. Should this occur, Solid IT will commit to maintaining the percentages off list reflected in this proposal.