Timmerhaus Ambassadors Application

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It is one thing to tell a young student the value of higher education. It is a completely different thing for that student to ***experience*** the thrill of a new idea, to feel the spark of curiosity in their own mind, to be struck by the "aha" moment, or to touch the wonder of a new discovery. It is the ***immersive experience*** that leaves a forever mark in the young brain that fuels the desire for higher education and for some, a lifetime love of learning.

I remember the first time I saw real human heart beating in the body of a patient undergoing vascular surgery. I was in high school, and I had taken all sorts of classes in math, biology, and chemistry. Then, I received a once-in-a-lifetime opportunity to observe a surgery and see a real human heart. I was awestruck. Later, I got to explore a plastic heart model in the physician's office. I opened the little doors of the plastic model and stuck my fingers into the chambers and through the valves. The doctor told me how the blood flows, where and why. I wanted more. From there, my love of human anatomy was born, and the pursuit of higher education followed. Thirty years later, I'm an associate professor of anatomy & neuroscience in the Modern Human Anatomy Program at the CU Anschutz Medical Campus. I direct the neuroscience curriculum for the CU School of Medicine, with a passion to help others experience this same wonder for learning.

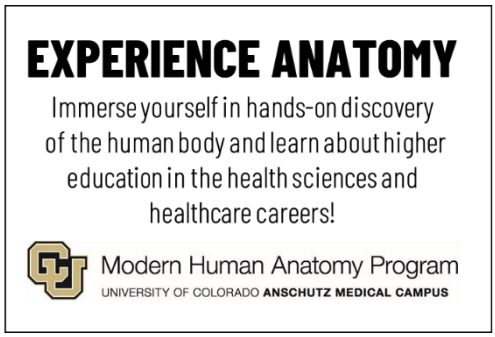
It is this transformative, hands-on, interactive experience that I want to provide for the youth of Colorado who may not be as fortunate as I was that special day my sophomore year of high school when I saw the human heart. To do this I have spent the last 5 years building an interactive anatomy library of plastinated human organs (collection viewable at www.anatomylibrary.org) for education and outreach. Plastination is a unique tissue preservation process popularized by Body Worlds museums, in which human organs from body donors are vacuum infused with polymers. Once plastinated, the organs can be taken anywhere, handled, and explored without the need for special ventilation or equipment. They are safe, dry, and durable, and they retain the contours, size, texture, and shape of the natural tissue (as imaged below). They are perfect for public outreach because they make the anatomy laboratory, typically only reserved for matriculated health professional students in a cadaver lab, accessible to the public.

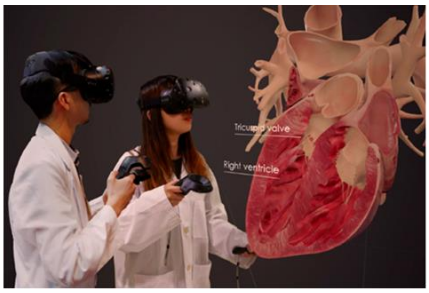




My proposal for the Timmerhaus Ambassador Program is to create "**EXPERIENCE ANATOMY", an interactive anatomy learning lab at CU Anschutz Medical Campus that is open to the public**. I propose to expand our current collection of plastinated models to accommodate 4 "Experience Anatomy" events in 2023-2024 (2 in-school field trips and 2 after school events) that will bring hundreds of high school students from the Denver Metro Area to experience higher education on our campus in a fun, free, hands-on, interactive way. These events will be similar to the "Body Worlds" museum experiences, except that students will be able to take the organs out of the glass display to touch and hold. They will also have the opportunity to explore the human body in extended reality (XR) using the Visible Human Dissector, a computer-based, interactive 3D tour of the human body developed at CU through the National Library of Medicine's Visible Human Project. This will be followed by a career panel, as well as social hour/mixer where high school students can chat with current students, faculty and staff from medical, dental, physical therapy, physician's assistant, and PhD programs, to reduce the intimidation factor and spark potential mentorship relationships. The event will conclude with an info session about degree programs and financial strategies by undergraduate pre-health advisors from all four CU campuses. The students' parents or guardians will be invited to attend the after-school events, which will enable parents to experience anatomy alongside their child and increase the enthusiasm and support of the higher education pursuit.

I have a strong relationship with the non-profit foundation Colorado Uplift, which will recruit and provide transportation for high school students and their parents from across the Denver Metro Public school system for the after-school events). Since the time of my preliminary Timmerhaus proposal in August and now, I have developed a relationship with the Denver Public Schools (DPS) Xplore Industry Exploration. I have registered the Modern Human Anatomy Program as an official "workplace partner", meaning that DPS will arrange and coordinate in-school field trips to our campus if this Timmerhaus Proposal presented here is funded. Moreover, I have a strong relationship with Touch of Life Technologies who will support the XR interactive component of the event with the VH Dissector software, equipment, and tech support. I am vice director of the Modern Human Anatomy Program, where I can recruit enthusiastic graduate students to volunteer for the events. The anatomy program has a strong track record of successfully hosting STEM outreach events in the past (see here for example), but this is the first time we will create a program with the focused goal to promote public understanding of (and hands-on experience of) the value of higher education in Colorado.





Virtual Reality Anatomy Laboratory (already in place and funded) that enables students to digitally dissect and explore the human body using the VH Dissector software.

New nervous system plastinate to be funded in part by this proposal

Current collection of Plastinated Organs in Anatomy Library on 5th Floor of Education-1 Bldg at the CU Anschutz Medical Campus
www.anatomylibrary.org

New circulatory system plastinate to be funded in part by this proposal

Why NOT Higher Education?

In my experience volunteering with high school STEM outreach over the last decade, I have heard four major factors that push students *away* from higher education:

1) **"It's intimidating"**. Students may not know anyone in their family or social network who has gone into higher education, or they just cannot visualize themselves in that type of life.
2) **"It's not fun"**: Students may believe that it is just not fun or exciting. They are amazed when they are wrong.
3) **"I can't afford it":** Students fear it will be impossible to pay for higher education
4) **"It's not worth it":** Students fear that the hard work of higher education may not lead to a fulfilling or financially stable career.

STRATEGIES

This program will dispel the above listed fears and misconceptions of higher education through the following four strategies:

1) **Strategy 1: Break the intimidation factor** and help high school students feel welcome and included by:
    a. Touring the campus and seeing what it is like.
    b. Wearing a lab coat & taking a photo of themselves in the lab to visualize themselves as a future student.
    c. Connecting with a graduate student or faculty on the CU Anschutz Medical Campus.
2) **Strategy 2: Provide a fun, exciting, hands-on experience** of higher education in CU health sciences by:
    a. Handling organs in the anatomy laboratory.
    b. Pretending to be an orthopedic surgeon with the arthroscopic knee surgery simulator.
    c. Flying through the human body with virtual reality technology (in a video game type experience).
3) **Strategy 3: Teach students the various financial pathways** to pay for higher education by:
    a. Hearing from career panelists students who have paid their way through school.
    b. Hearing from financial aid advisors about the options available.
4) **Strategy 4: Demonstrate the fulfilling and financially stable careers** available through higher education by:
    a. Hearing from current members of the Anschutz campus of a wide range of careers (medicine, dental, physician assistant, PT, nursing, information technology, data analysis, teaching, research, admin.)
    b. Hearing from career panelists who will explain the need for a healthcare workforce in our society.

(This sample itinerary would be adjusted for in-school vs. after-school format based on school schedules)

Time	Event Description	Location	Strategy
4:00 PM	**Official Welcome** Arrive, Name Tags, Introductions, snacks	Ed 1 Lobby	1
4:10 PM	**Suit Up & Smile!** Students put on lab coats & PPE, and take pictures in a "real medical school lab". Safety & Ethics Debrief.	Bone Room, 5th Floor, Ed. 1	1
4:20 PM	**Hands on Anatomy Lab** Students hold real human organs, learn about organ transplant technology, and use arthroscopic knee surgery simulator.	Anatomy Labs, 5th Floor, Ed. 1	2
5:00 PM	**Campus Tour** Transit to Fitzsimmons Building and show education buildings along the way. Show an example lecture hall. Share what students are doing in the classrooms and labs.	Boettcher Commons	1
5:15 PM	**Fly thru the Human Body in XR** Students use the *VH Dissector* Software to explore and virtually dissect the human body with virtual reality technology.	Anatomy Tech Suite, Fitzsimmons 5th Floor	2
6:00 PM	**"Tell your Story" Dinner/Mixer** Career Panelists share their educational pathway and current career. Students have opportunity to meet one-on-one with panelist after and sign up to shadow a mentor.	Fulginiti Pavilion	1 & 4
7:00 PM	**Pre-Health Advisors & Financial Aid Workshop** Presentations by CU Pre-health advisors on the undergrad majors & programs, and how to fund education (work study, scholarships, financial aid, military, etc.)	Fulginiti Pavilion	3
7:25 PM	**Wrap-up** Certificates, goodie bags & goodbyes	Fulginiti Pavilion	1

DENVER PUBLIC SCHOOLS

Modern Human Anatomy Program
UNIVERSITY OF COLORADO **ANSCHUTZ MEDICAL CAMPUS**

UpLift

BUDGET:

Funding is needed for anatomy teaching supplies, an event coordinator, volunteer gift cards, CU mementos, food and parking. This funding request includes plastination fees to expand the number of organs to accommodate large groups of students, as well as custom museum-grade locking cases to safely store the organs when not in use. The budget below estimates expenses to accommodate a four groups of students for 1 year (4 events). However, the long-term goal is that this will spark interest and investment for a permanent "EXPERIENCE ANATOMY" museum on the CU Anschutz Medical campus open to the public to fulfill Dr. Timmerhaus' goal to **promote public understanding of the value of higher education in Colorado and beyond.**

BUDGET	**COST PER UNIT**	**QUANTITY**	**TOTAL**
Anatomy Supplies & Plastination			
PPE (pads, gloves and face masks)	multiple		$700.00
Plastination fee (5 brains, 4 hearts, 1 set of kidneys, 1 liver, 1 set of lungs)	$1,000.00	12	$12,000.00
Body Systems Models (en bloc circulatory & nervous system) plastination	$5,000.00	2	$10,000.00
Padded transport containers (to take specimens out of cabinets)	$20.00	10	$200.00
Custom locking museum-grade storage cabinets	$3,500.00	2	$7,000.00
Personnel			
Grad student assistant (organ preparation and event coordination)	$25.00	300 hrs	$7,500.00
Gift cards for graduate student volunteers	$25.00	40	$1,000.00
Event Fees			
Catering & Event Housekeeping	$2,000.00	4	$8,000.00
Flyers, CU Logo mementos, Goodie Bags	$200.00	4	$800.00
Guest Parking	200	4	$800.00
GRAND TOTAL			$48,000.00

*** Note that Funding for the XR equipment ($50K) and current anatomical organs ($50K) has already been provided and is not requested here. ***