

Grant Number 1041

Project Title Vernier Senors &amp; Probes for the Study of Physiology and Pathophysiology

Please select the **MAIN** curriculum area your grant addresses. ScienceDoes your grant have a technology component? (Will you have technology equipment, software, etc. in your budget?)  
 No  
 Yes

### Primary Contact Information

First Name Benjamin

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Last Name Wilkinson

Phone Number 214-493-0006

Campus Allen High School

Main Subject Science - Secondary

Grade(s) 12

I have co-applicants. 

### Social Media

Please provide your work-related social media contact information.

Facebook

Twitter @MrBenAHS

Other (please specify)

Grant Number 1041

### Campus/Student Information

Your campus: Allen High School

Will other campus' be involved/impacted by this grant?  
 No  
 Yes

Your grade(s): 12

Will other grades be involved/impacted?  
 No  
 Yes

Please select all grades that will be involved/impacted by the grant.

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### Project Purpose

What is the problem, need or opportunity that this grant will address? Describe the impact of this project on your students. (500 words or less.)

TEA has set an expectation that all science classes meet a minimum requirement that 40% of the class time in a lab or field investigation. Our goal is to incorporate a variety of hands-on and inquiry type investigations to provide students opportunities to go deeper in their understanding of these complex concepts. We also want to encourage students to think about the physiology and pathophysiology of various human organ systems by measuring the activity of the upper respiratory tract, the lungs, the heart, the nervous system, and the musculoskeletal system. These are integral part of the anatomy and pathophysiology and pathophysiology curricula. Learners Services bought us the electronic version of the Human Physiology with Vernier lab book, which contains 24 experiments designed to encourage students to think about the physiology of various human organ systems. They also bought me a few of the probes that are used with the lab book. I would need more of the probes to have more lab set ups, so more students can complete and participate in the labs.

### Project Description

How will the project or program be implemented? Describe activities and tasks. Who is the target population and in what ways will they benefit? (500 words or less.)

The project will be implement in the anatomy & physiology and pathophysiology class. This affects approximately 252 - 315 anatomy and physiology per year and approximately 48 - 90 pathophysiology students per year. The probeware requested in this grant will allow the students to collect data on the physiology (how the organ functions) for the lungs, heart, nervous and muscles, as well as the probeware will provide data to simulate pathophysiology (when the organ is not functioning properly). They will also be used to observe results and apply learning based on data received.

Anatomy & Physiology has a major labs where normal physiology can be studied and applied. As the students learn about the structures and functions of each human body system, these labs will be used to solidify understanding of normal physiological functions. Therefore this probeware will be used throughout the entire school year.

Pathophysiology students also study the different body systems, however their focus is to explore the various diseases and conditions that can potential occur. In this learning students investigate and simulate pathogenic physiology and compare them to normal. These types of investigations occur throughout the year, therefore the probeware will also be used throughout the school year.

### Project Summary

Provide a brief summary for use on the Foundation's website and social media. (2-3 brief sentences)

Anatomy & Physiology and Pathophysiology students will use Vernier probeware to by measuring the activity of the upper respiratory tract, the lungs, the heart, the nervous system, and the musculoskeletal system.

### Allen ISD Goals/ TEKS

Which Allen ISD goals/TEKS does this project support? Provide only two or three examples.

Anatomy & Physiology 2F collect and organize qualitative and quantitative data and make measurements with accuracy and precision using tools such as calculators, spreadsheet software, data-collecting probes, computers, standard laboratory glassware, microscopes, various prepared slides, stereoscopes, metric rulers, electronic balances, gel electrophoresis apparatuses, micropipettors, hand lenses, Celsius thermometers, hot plates, lab notebooks or journals, timing devices, Petri dishes, lab incubators, dissection equipment, meter sticks, and models, diagrams, or samples of biological specimens or structures;

Patho.3F collect and organize qualitative and quantitative data and make measurements with accuracy and precision using tools such as calculators, spreadsheet software, data-collecting probes, computers, standard laboratory glassware, microscopes, various prepared slides, stereoscopes, metric rulers, electronic balances, gel electrophoresis apparatuses, micropipettors, hand lenses, Celsius thermometers, hot plates, lab notebooks or journals, timing devices, Petri dishes, lab incubators, dissection equipment, meter sticks, and models, diagrams, or samples of biological specimens or structures;

### Measurement

What specific measurements will be used to evaluate the effectiveness of the project? (500 words or less)

The effectiveness of this grant will be measured by improvement of students understanding of the normal and pathological physiology. In Anatomy & Physiology, there are only a few physiology labs that we do and we are always wanting to improve because we are wondering if they data they get is actually valid. With the introduction of these probes, their understanding will improve, thus study for theses assessments will be improved, therefore their achievement on assessments will likely improve. The same can be said for pathophysiology, where we will simulate pathologic processes and which they will be able to compare to normal. The action of simulating pathology should help them improve learning and understanding of the disease process.

### Teaching Methods

What teaching methods will be used to implement this project? (500 words or less.)

TEA has set an expectation that all science classes meet a minimum requirement that 40% of the class time in a lab or field investigation. We will use these probes and software to better meet this requirement. Anatomy & Physiology and Pathophysiology use an asynchronous mastery learning strategy in which students are expected to demonstrate learning before moving on to the next learning objective. In courses like these, it is often difficult to have effective labs that are not just dissections. Yet, I have students year after year tell me that the hardest part of these classes are the physiology because they "can't see it." In this learning environment, students are introduced to the different physiology in a flipped lecture video. These probes will allow student explore physiology and apply what they learned in the videos. The student must then demonstrate their understanding of the physiology by passing a formative assessment which we call a mastery check. Students are not allowed to proceed on to the summative assessment, unit tests, until they prove to themselves and the teacher they are able to be successful on the mastery check. This results in an asynchronous classroom in which students are learning at their own pace, however students avoid development of learning gaps because they are not allowed to move on until the prove mastery.

### Timeline

What is the project timeline and the date of implementation?

Implementation would begin immediately in pathophysiology because we are doing variations of the lab now with less probes. We will start with heart rate monitors, Blood Pressure Sensor, Surface Temperature Sensor and Stainless Steel Temperature Probe in unit 1 (Aug-Sept, 2019). Spirometer and Go Direct Respiration Belt will be used in unit 7 (Jan-Feb, 2020), Hand Dynamometers will be used in unit 10 (April 2020).

Anatomy will begin the following school year with the lung capacity lab (Spirometer, Feb. 2020). We will experiment with others based on the lab book that was bought by learners services through the entire spring semester 2020. This school year videos will be made by teacher using the probes to do prelab instructions for next school years labs.

### Curriculum/System Support

Explain how this idea or project enhances/supports Allen ISD curriculum or existing systems.

These probes will support the district curriculum goals to incorporate the process standards throughout the school year in anatomy and physiology and pathophysiology. This will also allow the students to have a more varied lab experience while maintaining at least 40% of instruction time as laboratory investigations in class. We are asking for several probes to be shared between two teachers. This amount of probes will support lab groups of four students. Keeping groups to this size will allow for more student engagement and better learning.

Budget Details \*\* All awarded funds will be available by September of the next school year.

Budget Item	Item Type	Unit Cost	Quantity	Total Cost
LabQuest® Mini ( <a href="https://www.vernier.com/products/interfaces/lq-mini/?search=lab&amp;category=autosuggest">https://www.vernier.com/products/interfaces/lq-mini/?search=lab&amp;category=autosuggest</a> )	Technology	149.0	2	298.0
Surface Temperature Sensor ( <a href="https://www.vernier.com/products/sensors/temperature-sensors/sts-bta/">https://www.vernier.com/products/sensors/temperature-sensors/sts-bta/</a> )	Technology	23.0	5	115.0
Hand-Grip Heart Rate Monitor ( <a href="https://www.vernier.com/products/sensors/heart-rate-sensors/hgh-bta/">https://www.vernier.com/products/sensors/heart-rate-sensors/hgh-bta/</a> )	Technology	119.0	5	595.0
Blood Pressure Sensor ( <a href="https://www.vernier.com/products/sensors/bps-bta/">https://www.vernier.com/products/sensors/bps-bta/</a> )	Technology	105.0	5	525.0
Stainless Steel Temperature Probe ( <a href="https://www.vernier.com/products/sensors/temperature-sensors/tmp-bta/?search=tempera&amp;category=autosuggest">https://www.vernier.com/products/sensors/temperature-sensors/tmp-bta/?search=tempera&amp;category=autosuggest</a> )	Technology	29.0	7	203.0
Spirometer ( <a href="https://www.vernier.com/products/sensors/spr-bta/">https://www.vernier.com/products/sensors/spr-bta/</a> )	Technology	199.0	5	995.0
Go Direct Respiration Belt ( <a href="https://www.vernier.com/products/sensors/respiration-monitors/gdx-rb/">https://www.vernier.com/products/sensors/respiration-monitors/gdx-rb/</a> )	Technology	99.0	7	693.0
Hand Dynamometer ( <a href="https://www.vernier.com/products/sensors/hand-dynamometers/hd-bta/">https://www.vernier.com/products/sensors/hand-dynamometers/hd-bta/</a> )	Technology	99.0	5	495.0
Disposable Mouthpiece for Spirometer 100 pack ( <a href="https://www.vernier.com/products/accessories/spr-mp30/">https://www.vernier.com/products/accessories/spr-mp30/</a> )	Technology	36.0	4	144.0

BUDGET TOTAL 4,063

Are there any additional funds available for this grant? Campus or District Funds? PTA funds? Let us know if you have or will be seeking funds from other sources to help with this project.

Additional funds?  No  
 Yes

### Principal Approval Required

Please provide the Name and Email of your PRINCIPAL. (Not your name)

First Name	Last Name	Email Address <small>(Completed)</small>
Jennifer	Fuller	jennifer.fuller@allensisd.org

### Applicant Signature

By entering my name below I signify that I understand that if I move within the District and have written the grant myself, I may take the grant with me to my school (as long as it is appropriate for my classes). If I have written the grant as part of a team, I will leave the grant behind with the team. If I leave AISD, I will leave the grant with the school for which I wrote the grant. As a condition of this grant, I will complete an evaluation form provided by the Foundation.

Signature Benjamin B. Wilkinson

Date 01/16/2018

I certify that this would be a good use of funds for our school and this grant supports the district goals and/or our campus improvement plans. \*\*Do NOT include any identifiers, such as: campus name, your name, teachers name or mascot \*\*

No actions possible.

### Comments

I approve.

### State Change History

State Change benjamin.wilkinson@allensisd.org  
01/16/2019 16:35:58  
Submitted

State Change \*\*\*\*\*  
02/01/2019 07:32:42  
Accepted

### Grant Status

Grant Awarded  Yes  
 No

Award Amount 1788