DHEDF Rural STEM Initiative – Overview of Texas Biomedical Research Institute
DHEDF Rural STEM Initiative Collaborating Organization
As of 12 May 2023

To: DHEDF National Rural STEM Initiative Participating Schools

From: Wayne I. Fagan, DHEDF Chair

Date: 12 May 2023

Subject: Summary of info received from Texas Biomedical Research Institute and posted to DHEDF Rural STEM Initiative Private Pages for Participating Schools

Resources designed for use in Grades: K-12

Team:

Introduction:

The information contained in this memo was graciously provided to us on behalf of Texas Biomed by:

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Texas Biomedical Research Institute (Texas Biomed) is a leader in pioneering infectious disease research. Through their education outreach programs, they share scientific breakthroughs to protect you, your families and our global community from the threat of infectious diseases. The Texas Biomed education program supports this mission through free, downloadable curricular units, funded through the NIH Science Education Partnership Award (SEPA). Texas Biomed curricular resources are the product of collaborations between experienced science teachers and Texas Biomed scientists to ensure accuracy and up to date information for each activity. Each unit consists of lessons which include activities. These resources have flexibility, meaning units can be implemented in their entirety or divided into stand-alone activities to support

existing curriculum. Activities engage students in critical thinking, model making, and hands-on lab experiences connected to current science issues. Designed for implementation across the nation, units are aligned with national education standards, the Next Generation Science Standards (NGSS), and the Texas Essential Knowledge and Skills (TEKS).

As a first step to learning more about Texas Biomed Education Outreach programs, including Bioscience and Aerospace, we invite you to review the following information and links shared with us by Dr. Riggs:

1) **To illustrate how the work being done at Texas Biomed relates to aerospace we invite you to view the virtual presentation by Dr. Riggs to Stapleton Elementary School entitled "Bioscience and Aerospace" at** https://dhedf.org/videos/item/bioscience-and-aerospace

2) **Texas Biomed Education & Outreach Home Page** - https://www.txbiomed.org/education-outreach/

3) **Texas Biomed Discover & Learning Initiative: K-12 Science that Inspires –** K-12 Science That Inspires - Texas Biomed (txbiomed.org)

4) **Curricular Units: https://www.txbiomed.org/education-outreach/educational-resources/curricular-units/#**

   a) **Pulmo Park - Exploring the Respiratory System:** Understanding the structure and function of the respiratory system is vital to making informed decisions to maintain health. Pulmo Park provides a comprehensive overview of the pulmonary system, from integration of body systems to investigations about how structure influences function. Students will observe, gather and analyze data while exploring the impact respiratory diseases and environmental factors impact the respiratory system and overall health.

      i) **Mapping Pulmo Park:** Mapping Pulmo Park provides foundational information about lung structure and function, starting with the critical thinking activity (*Think About It*), followed by construction of a respiratory model (*Reverse Lung Dissection*). The lesson culminates with a Poster Presentation to showcase student understanding of structure and function of the respiratory system and the impact of environmental issues, genetic factors or life choices on the respiratory system.

      ii) **Respiratory Exploratory:** Within this lesson, students will engage in laboratory explorations, discovering the impact environment has on the

pulmonary system. The students engage in labs which simulate various lung functions, gather data, and apply critical thinking skills to answer guiding questions associated with each activity and lab. These experiential labs can be conducted as stand-alone events or divided into a rotation format. The background piece is important for students to understand the significance of each lab as they construct connections between the lab activities and the function of the respiratory system.

iii) **Respiratory Exploratory – Diving Deeper:** Within this lesson, students will engage in hands-on experiments which explore the impact the environment has on the components of the pulmonary system. Students will simulate various lung functions, gather data, and combine critical thinking skills with prior knowledge of the respiratory system structures to answer guiding questions associated with each activity and lab. These experiential labs have flexibility, meaning they can be conducted as stand-alone events to introduce or reinforce concepts. The experiments can be grouped or conducted in rotation. The Student Information provides important information for students to construct connections between the lab activities and the function of the respiratory system.

b) Tuberculosis Unit: On a global scale, *Mycobacterium tuberculosis* (aka: TB) persists as the ninth leading cause of death from an infectious pathogen. Every day, 4,400 people are infected with TB. In this lesson, *Good News! TB Killer on the Loose*!, students will evaluate data obtained from an article written by TB researchers at Texas Biomedical Research Institute. The lesson is based on a published scientific research article about TB. Such articles can be challenging to read and understand. To make the research easier to understand, middle school and high school teachers read the article, talked with scientists, and created a transformed article. The transformed article is shorter, easier to read, and more accessible. *Good News! TB Killer on the Loose!* explores how TB spreads from person to person and investigates how the body's immune system responds to this bacterial invader!

i) Good News! TB Killer on the Loose: In these activities students will create products and/or explain the impact of TB on the body and explore the body's immune responses to the bacterium. Students will showcase their acquired knowledge through completion of items from a Choice Board (Activity A: Infect Me…If You Can!), demonstrate their data analysis skills by interpreting graphic representations of data from TB research (Activity B: Getting Graphic with TB), and finally, students will write an abstract or summary of what they have learned about TB. From the written abstract, students will create a

visual abstract, using pictures and diagrams to convey what they have learned (Activity C: Visual Abstract).

5) **Tours: https://www.txbiomed.org/education-outreach/tours-of-texas-biomed/high-school-tours/**

To ensure our mission in providing an educationally rich environment at Texas Biomed, we offer In Person and Virtual tour programs for high school and community organizations.

a) In Person Tours: In person tours of Texas Biomed are available for area and regional high schools, grades 9 through 12. Each tour includes a walking or windshield tour of the Southwest National Primate Research Center (SNPRC) and a discussion with a Texas Biomed scientist who will share information about their current research. Tours are limited to 30 individuals, including teachers/chaperones.

b) Facilitated Virtual Tours: Virtual tours of the Texas Biomedical Research Institute (Texas Biomed) are available for secondary classes, 8th grade through 12th grade. Virtual tours are conducted via Zoom and are well suited for classes and clubs. Virtual tours can be viewed as a class or individually. If viewed individually, virtual tours can accommodate up to 50 participants. If viewed as a class or club, the limit is up to the coordinating teacher.

6) Additional sources of information about Texas Biomed

a) Search for Texas Biomed in the DHEDF General Search engine at https://dhedf.org/search?f=2&q=texas+biomedical+research+institute&Search=
b) Search for Texas Biomed in the Private Pages of the DHEDF Rural STEM Initiative Discussion Group at https://dhedf.org/forum/all/latest?category=23

c) Search videos posted to Texas Biomed You Tube Channel - https://www.youtube.com/@TexasBiomed/videos

We are grateful to Dr. Rosemary Riggs and the Texas Biomed team for their commitment to STEM Education in general, the great resources they make available to the public, and their collaboration with the DHEDF Rural STEM Initiative. As DHEDF becomes aware of additional resources from Texas Biomed this document will be supplemented from time to time.

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Caveat: From time to time, as in this case, DHEDF will share opportunities with you or make recommendations to you. It is totally up to you whether you wish to take advantage of those opportunities, DHEDF makes them in good faith, but they may not fit with your programing. DHEDF also wants to make it very clear that DHEDF has no financial interest in nor does it receive any financial benefit from any of the products or services we suggest to you for your evaluation.

If you have any questions concerning any of the foregoing or any other questions about DHEDF in general or the Rural STEM Initiative **please contact me, Wayne I. Fagan, at (210)570-7888 or** wifagan@wifagan.com

Thank you again for your participation in the DHEDF National Rural STEM Initiative, we are honored to have you, your schools, and your students as part of this Initiative.

Wayne I. Fagan | Chair
Dee Howard International Education Foundation

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