

MPNA-GREEN Medical Academy Integration into STEM Curriculum

ABSTRACT

Madison Park Neighborhood Association (MPNA) was formed in 1987 to serve Santa Ana, CA, and founded Getting Residents Engaged in Empowering Neighborhoods (GREEN) in 2011. MPNA-GREEN's two main objectives are (1) supporting youth and families to pursue educational and leadership opportunities and (2) improving health equity outcomes. In 2021, MPNA-GREEN Medical Academy functioned as a standalone program targeted at SAUSD students. One of the major limitations was student retention especially when they felt overextended with involvement in parallel STEM Academy. In 2022, the program is integrated into the STEM Academy, specifically the elementary component. Hands-on components return to this year's programming, with in-person sessions in late Spring 2022. Gaining support from community members translates as consistent involvement in other MPNA-GREEN efforts: virtual forums with physician speakers, vaccine clinics, and collaborating with Santa Ana residents in creating introductory mental health curriculum as a response to the pandemic-related mental health crisis. Collaborative efforts are more successful especially when they do not disrupt the workflow of community-vouched for projects.

BACKGROUND

MPNA-GREEN & Santa Ana, California

- Collaborations with the Santa Ana Unified School District, The City of Santa Ana, James Madison Elementary School, and University of California, Irvine.
- involved in the Santa Ana Building Healthy Communities (SABHC) initiative.
- Young, predominantly Hispanic/Latino population, with 44% under age 25 and 94% Hispanic/Latino.
- The aggregate median income falls below 200% of the Federal Poverty Level, and 99% of elementary students qualify for Free/Reduced Price Meals.

Santa Ana Unified School District

- Madison Elementary School - Principal Lisa Solomon
 - 1,055 students in grades K-6
 - % students at appropriate math proficiency is 29% (vs California average of 40%) for the 2018-19 year

Medical Pipeline Program

- Minorities are underrepresented in the healthcare workforce, in particular physician roles where they can make a significant impact on community health. Providing mentorship and early exposure is a way of normalizing pursuit of STEM and medical careers.



OBJECTIVES

- Support STEM-focused Saturday Academy program with mentorship
- Integrate Medical Academy curriculum blocks (CARDIO/PULM, GI, NEURO, MUSCLE/SKELETAL) into Science Academy
- Create medical correlate educational material for technology, engineering, physical sciences blocks
- Mental Health component – two separate lectures on Depression & Anxiety in youth
- Incorporation of medical-themed rewards into participation

METHODS

- Recruitment of volunteer physicians, residents, medical students through UCI Health System and UC Irvine School of Medicine
- Undergraduate Mentor Recruitment: UCI & UCLA (MPNA-GREEN)
 - Academic Background
 - Engineering
 - Physical Sciences
 - Pre-Medical
- School: Madison Elementary School
- Enrollment: Parental Permission through Site Contacts
 - Principal Solomon
 - Dr. Zaldivar
 - Jose Rea
 - Destiny Macias
- Curriculum Delivery:
 - Zoom (pre-April 30) – PowerPoint lectures, breakout sessions, Google Classroom
 - In-Person (April 30 and on) – Supervised experiments, Medical sessions (fieldtrip to UCIMC, postponed for 2021 and 2022)
 - Pre-Recorded Lectures – Mental Health lectures on Depression and Anxiety



Saturdays	Notes	ALMA SA		
September 18, 2021		Student and Parent Orientation	November 20, 2021	Thanksgiving Break Nov 19-26
September 25, 2021	1st week of UC instruction	Week 1: COVID & The COVID Vaccine/The Scientific Method	November 27, 2021	Thanksgiving Weekend
October 2, 2021		Week 2: The Scientific Method	December 4, 2021	UC Finals Week starts
October 9, 2021		Week 3: DNA	December 11-December 31	UC/SAUSD Winter Break
October 16, 2021		Week 4: The Cell	January 8, 2022	Week 9: Meeting TBD
October 23, 2021		Week 5: Human Anatomy & Human diseases pt.1		
October 30, 2021		Week 6: Human Anatomy & Human diseases pt.2		

Biology Physiology


- First half of curriculum is Biology-oriented
- Medical student volunteer lecturers for human anatomy and COVID topics
- Primary teaching roles: undergraduate volunteers
- *Integration of medical correlates in 1-2 slides per lecture.*

Saturdays	Notes	ALMA SA	March 19 - March 25, 2022	UC Spring Break
January 15, 2022	MLK Jr. Day - January 17th	No Meeting	Saturdays	Notes
January 22, 2022		Week 10: Climate Change & Modern Engineering	April 4 - April 8, 2022	SAUSD Spring Break
January 29, 2022		Week 11: Intro to coding	April 16, 2022	SAUSD No School: April 18th
February 5, 2022		Week 12/1.	April 23, 2022	Week 15: Motors, Generators, & Environmentally friendly power
February 12, 2022	Holiday-Feb 11th		April 30, 2022	Week 16: Intro to 3D Printing
February 19, 2022	President's day: Feb 21st			
February 26, 2022		Week 13: Intro to the Arduino		
March 12, 2022	UC Finals Week starts	Week 14: Field Trip		

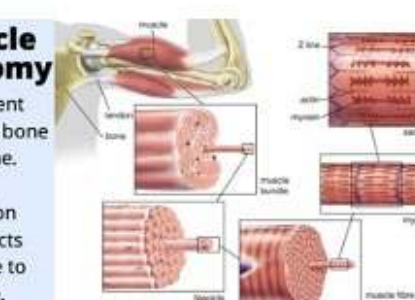
Engineering Computer Science Physical Sciences

- Engineering & Tech
- *Integration of medical correlates in 1-2 slides per lecture. Examples:*
 - *Medical Devices*
 - *Artificial Intelligence*
 - *Coding Role in Medicine*

In Lab Preserved



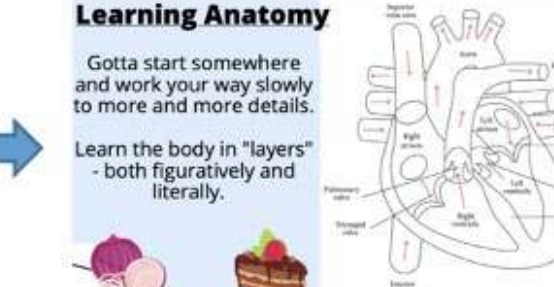
Muscle Anatomy



Learning Anatomy

Gotta start somewhere and work your way slowly to more and more details.


Learn the body in "layers" - both figuratively and literally.



Sprains vs Strains

Sprains - are caused by overstretching or even tearing of ligaments (could even "hear" a "pop"). The most common location for a sprain is in your ankle. Signs: Pain, swelling, bruising.

Strains - muscle or tendon injury from over-stretching or from partial tears. Strains most commonly occur in the foot, leg, or back. Signs: Muscle weakness, inflammation, pain.



Figures:

1. Anatomy: Simplifying Content, Removing Cadaver Images
2. Anatomy: Changing emphasis to Clinical Correlates
4. Anxiety Lecture for Youth: Slide on Definition
5. Depression Lecture for Youth: Slide on Warning Signs

Let's Talk About Anxiety

Anxiety is a natural human reaction that involves our body and mind. When we think we are in danger, our anxiety becomes our alarm system in our body!

So why is anxiety so bad?



What does depression look like?

Symptoms of Depression in Children and Adolescents

- Loss of interest
- Changes in sleep patterns
- Changes in appetite
- Loss of energy
- Thoughts of death or suicide
- Lack of interest in usual activities
- Sense of helplessness or hopelessness

Signs Your Teen May Have Untreated Depression

- Loss of weight
- Loss of interest in usual activities
- Changes in sleep patterns
- Changes in appetite
- Thoughts of death or suicide
- Sense of helplessness or hopelessness



RESULTS

- On average 38 students per session at the elementary school level.
- Middle and high school programs at most had 15 participants per session.
- Prizes are successful at increasing active participation during sessions and student retention
- Engagement in Zoom platform remained high although issues impacted participation:
 - Poor internet connection limited participating to text in chat (no camera or voice)
 - Unable to assist students who require one-on-one guidance
- In Person sessions provided more interactive and improved student group collaboration (vs Zoom breakout sessions) and participation.
 - Some Zoom experiments required supply pick-up at school (Madison) to offset this
- Integrating mental health topics requires more discussion with MPNA-GREEN for future curriculum.

CONCLUSIONS

- Integrating curriculum additions into a successful STEM program ensured participation was not affected by competing programs
- MPNA-GREEN long-standing history with community and institutions play into parental support in enrolling youth in associated programs
- Ongoing connections with college students and medical students especially those of URiM background leave a significant impression on youth
- Incentives geared toward medical careers motivated students to participate more frequently, consistent attendance
- Collaborations with Santa Ana residents (now medical students) and medical faculty are effective in the quality improvement of programs and providing clinical validity.



Thank you:

- United Health Foundation
- NMF Diverse Medical Scholars Program
- National Medical Fellowships
- UC Irvine School of Medicine
- MPNA-GREEN and Jose Rea
- Destiny Macias