

PINE VIEW SCHOOL 2020-2021 CDR

I. PINE VIEW SCHOOL BIOMEDICAL ENGINEERING SOCIETY CHAPTER DEVELOPMENT REPORT

August 2020 - May 2021

PINE VIEW CAMPUS:

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Executive summary: In spite of COVID-19, the Pine View BMES Chapter has worked to overcome the newfound barriers. The Pine View BMES Chapter meets at 2 P.M. on zoom every Tuesday. Not only do we serve as a BMES chapter, but we also serve as a community for dedicated students who share a passion for biomedical engineering. Together, we aim to complete our projects thoroughly in order to gain new knowledge and experiences. With each of our member's contributions, we brainstormed, planned, and researched a project on a data analysis of the effects of glyphosate. In our project, we collaborated with an expert in the field, Dr. Winchester of Riley's Children Hospital. We examined the effects of glyphosate on various health issues in various states in the United States and throughout the world. Through this project, we developed our data collection skills and understanding of biological sciences through a real world application. Our peers and fellow club members have all benefited from our experiences shared and have worked to improve our project with every meeting. Despite the unprecedented challenges faced in a COVID-19 pandemic, the Pine View BMES Chapter has remained a team ready to take on the world through biomedical science.

II. COVER LETTER

Dear National BMES:

During our second year as a high school chapter of the Biomedical Engineering Society, Pine View BMES' goal was to foster interest in biomedical engineering through educational and social engagement opportunities for students. We began the year with four returning members from the previous school year. They worked to gain new members and introduce interested students to the club and the field of biomedical engineering. Students began investigating various areas of interest within the field and provided club members with the opportunity to explore areas of interest. Students were able to research and discuss recent developments in the biomedical field. The club grew to consist of ten members with an elected executive board. Social, mentor, and outreach committees were formed and assigned appropriate projects. Our chapter met weekly and accomplished several activities, including social activities, community volunteering and scientific research.

Members of our club collaborated this year on a research project investigating the effects of glyphosate on the health of individuals correlating to their state demographics. Dr. Paul Winchester of Riley's Children's Hospital/Indiana University has helped guide and mentor the students through the project through virtual zoom meetings. The students will continue to work with Dr. Winchester next year on the project. This data analysis project worked perfectly as remote learning was one of the challenges the students faced this year.

The organization has continued this year to construct masks for local organizations. Hundreds of masks were donated to frontline workers, such as the Georgia Medical Group and First Physician Group in Sarasota. The students have volunteered at youth science organizations, such as STEM Saturdays and the FAB Lab. Members were also involved in this year's Sarasota Blood and Vaccine Drive.

For the upcoming 2021-2022 academic year, Pine View BMES is looking forward to being back on campus and increasing its visibility among high school, middle school, and elementary school students. We plan to expand fundraising efforts beyond campus and increase our presence in the local community. Pine View BMES members are committed to the growth of the chapter, continuing research and eager to promote interest in the field to their peers.

Sincerely,

Ray Min, Sonica Prakash

Ray Min, Sonica Prakash

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IV. ADMINISTRATIVE REPORT

The Pine View School Biomedical Engineering Society, formed in 2019, was the second high school in the nation to have a high-school BMES chapter. Our current executive board has the president, the vice president, the treasurer, and the secretary, which are democratically elected at the end of each school year. We have continued our social, mentoring, event planning, and outreach committees from last year, which were able to expand our scope and reach out to more people. However, it was much harder to organize and execute events because of the current pandemic. Our committees met weekly and were open to all, which increased involvement as well as retention of general members. Meeting agendas are shared a day prior to the meetings, so that all members are aware of what the plans are before they enter the room. The meeting agendas are also saved for future reference to make sure we know what tasks have already been taken, which is also highlighted in the weekly Trello/Kanban board. Meeting minutes are also written by the secretary, so that we can compare our goals and how many of them that we accomplished. Although we had many plans for the rest of the school year, the current pandemic had to cut our school short, which led to the cancelation of some events, including our fundraisers.

Faculty Advisor, Ms. Becky Kehler, rebecca.kehler@sarasotacountyschools.net

President, Ray Min and Sonica Prakash, pvsbmes@gmail.com

As the President, of the organization, in charge of overseeing all operations, maintaining relations with the PVS Bioengineering Faculty Advisors, corresponding with other chapters of BMES, presiding over all meetings, and managing the overall direction of the org. Also networking with other BMES student chapters and other organizations, and bringing professional and career development opportunities to members.

Vice President, Rohit Upendram,

Responsible for membership logistics, facilitating communication between the officers and members, keeping administrative tabs on the officer board, and ensuring overall member engagement.

Treasurer, Ricky Siwicki,

In charge of managing all PVBMES funds, allocating money to the committee chairs, applying for external sources of funding, and contacting potential sponsors.

Secretary, Krystal Tran,

Ensure meetings are effectively organized and minute. Maintain effective records and administration. Uphold the requirements of research documents, charity policy, event policy. Communication and correspondence.

PVSBMES

Meeting Minutes Example

11/24/20 Meeting Minutes

Announcements

- *Membership Dues (\$30 per person)*

Discussion of Research

- *Research Question: What are the effects of glyphosate on the genetics that cause human diseases, such as Non-Hodgkin's Lymphoma?*
- *Read over Dr. Winchester's emails*
 - *Understood his work better*

Direction of the Project: Furthering research

Gist of things: find something that can be correlated to pesticide levels

- *Correlate free carnitine levels in the mitochondria with pesticide levels (Sonica)*
 - *Dealing with fat metabolism*
 - *Can connect with health diseases*
- *States have public data regarding newborns (Ben)*
 - *Department of Health*
- *Swab testing with seasonal pesticide use (Krystal)*
- *Fatty liver (Everyone, but Krystal)*
 - *Fatty liver disease could be correlated with other similar diseases and pesticide levels*
 - *Organ systems as the year progresses*
- *Pesticides change microbiome (Krystal)*
 - *Can be related to diseases and pesticides*
- *Diseases and birth months (Ray)*
 - *Birth months and pesticide use*

To-do Overbreak

- *Find databases regarding data (assigned above)*
- *Dr. Winchester CDR paragraph*

V. TREASURY REPORT

The Pine View chapter of Biomedical Engineering Society gained funds through the production and sale of BMES-branded T-shirts as well as participation in the Pine View Fair, an event at Pine View School which puts the spotlight on groups that choose to participate. Through the Pine View Fair, the chapter earned \$191 in proceeds from a booth set up and run by five members of the group throughout the day. The T-shirt sales produced a revenue of \$135, a profit of \$45 for chapter project use. In order to promote efficiency and profitable activity, meeting costs were maintained at \$0 for the full year, allowing successful collaboration without any net loss. The data analysis project was also kept at a cost of \$0 throughout the entire project, allowing resourcefulness and other parties, such as Dr. Winchester, to keep the project running while also preserving available funds for the main project.

T-shirt sales:

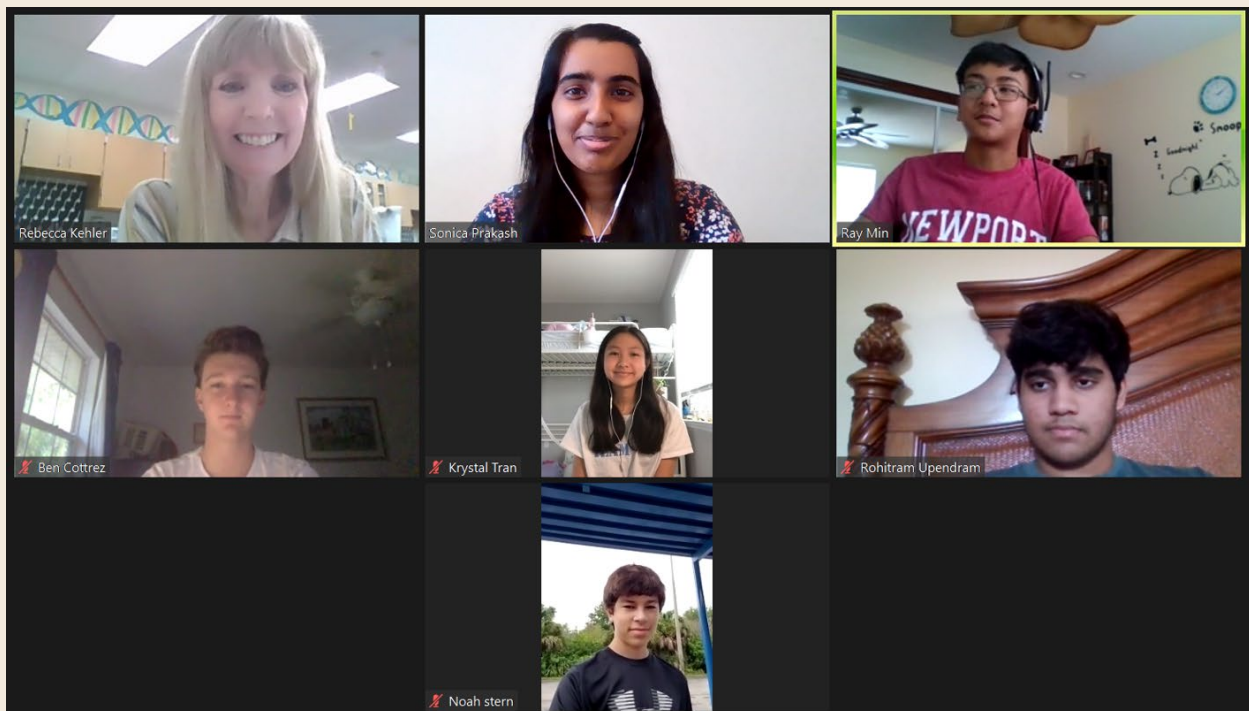
- \$10 production cost per shirt.
- \$15 sale cost per shirt.
- 9 shirts produced and sold, \$135 revenue with \$45 profit.
- Data Analysis Project: \$0
- Meeting costs: \$0
- Last Year's Pine View Fair Funds (Remaining) - \$151



Balance Summary	Q1	Q2	Q3	Q4
Starting Balance	\$151	\$106	\$151	\$151
Credit	\$0	\$135	\$0	\$0
Debit	-\$45	-\$90	\$0	\$0
Final Balance	\$106	\$151	\$151	\$151

VI. CHAPTER ACTIVITIES

Overall, our chapter has been able to complete several activities during this past year. Our weekly zoom calls ensured that our club not only maintained social distancing guidelines, but also remained connected and active in our various activities. Limited to virtual projects to ensure that every club member could participate, whether they attended school in person or virtually, very little funds were expended. Nevertheless, our club was able to participate in a large amount of activities not only throughout the community, but organized by the club as well. For example, many members had the opportunity to volunteer at the Faulhaber Fab Lab in a variety of their events as well as at local hospitals throughout Sarasota County. The biggest focus of the majority of our meetings was our data analysis project on the effects of glyphosate that was mentored by Dr. Winchester of Riley's Children Hospital and the Indiana University of Medicine. We made great progress on these meetings and were able to apply our project to both a national and international scope. The Pine View BMES Chapter is proud to have bettered our community through the various chapter activities completed throughout the year.



VII. SOCIAL ACTIVITIES

The unprecedented barriers posed by COVID-19 made in-person gatherings difficult, but the Pine View BMES Chapter was able to maintain social activities throughout the school year. Throughout the year, we regularly had introductory meetings that welcomed new members and caught them up with our current projects. These meetings helped to create an environment that embraced new students that had new ideas. Throughout the school year, members were also part of a various number of other activities outside of the chapter as well. These shared activities helped to foster a network beyond the Pine View BMES Chapter. Lastly, we held weekly zoom meetings with all club members. During these meetings, we collaborated on our main glyphosate project and discussed our ideas pertaining to biomedical engineering.

Activity	Dates	Description	Attendance
Speech and Debate	Weekly, August 2020 - May 2021	Club members utilized public speaking skills to advocate for solutions for real-world problems.	3 Members
Technology Student Association	Weekly, August 2020 - May 2021	Club members used technology to participate in various STEM competitions	3 Members
Fab Lab Ambassador	April 30, 2021	Club members met with other students around the Sarasota County to discuss technological developments	4 Members
Weekly Zoom Meetings	Weekly, August 2020 - May 2021	Club members met regularly to research glyphosate and share ideas pertaining to biomedical engineering	All Members

Speech and Debate Successes



Fab Lab Ambassador



Masks Made



VIII. INTERCHAPTER ACTIVITIES

Because of the Current Pandemic, it was hard for us to interact with other chapters in person. This led to us only being able to meet less chapters than usual. Officers have contacted other Universities through emails so the club could have sustained zoom calls. This allows members to better understand the industry since this is not normally exposed during school times. The interchapter activities allowed us to continue our projects and look into professionals about subjects that we were interested in including pesticides with Dr. Winchester. All of our meetings involved him since he had the strongest impact on the project that was worked on throughout the school year. Each meeting was unique and was different in information we received. We also have interacted with the University of Florida Biomedical Engineering Club, but these plans were cut short because of the COVID-19 situation. In future years, we plan to meet other chapters, mainly across Florida, in person.

Dr. Winchester, Indiana University Biomedical Engineering Meeting 11/3/20, 7 members

Cost = \$0

Pine View BMES students met with Dr. Winchester on 11/3/20 asking many questions about glyphosate including “Do you have any neurological data?” and “If the genetics are diluted, how did the third generation have a higher frequency of multiple diseases?” These questions were brainstormed in meetings prior to the zoom call with the professor. Since many of us have taken statistics classes and wanted to focus our yearly project on data science and pesticides (he has done research on similar fields).

Dr. Winchester, Indiana University Biomedical Engineering Meeting 2/9/21, 8 members

Cost = \$0

On 2/9/21, Pine View BMES students met with Dr. Winchester for assistance on the glyphosate project. Dr. Winchester assigned students with a project on finding specific data throughout a dataset. This assignment taught students about the difficulty of finding government data, and the outside influences that limit its availability. The main question we approached Dr. Winchester was “How can we find accurate data sets in specific regions?” This meeting left students with suggestions for how to find datasets and lessons on the importance of data for our communities.

IX. OUTREACH

The PVBMES chapter strives to improve and increase their own and others' knowledge of STEM. Due to COVID-19, outreach during this past year has been limited, but achieved. The BMES members have worked to spread our club's name and information through volunteer work and clubs. Through this, the club has recruited several new high school members, ranging from grades 9 to grade 12. The club has spread information by doing volunteer work at Sarasota Memorial Hospital, the Sarasota Fab Lab, blood drives, and COVID-19 vaccine drives. Moreover, the PVBMES club has also done work at Pine View School's Robotics Club, where students gained the opportunity to further explore the STEM fields.

I. Volunteering at Sarasota Memorial Hospital:

Sarasota Memorial Hospital's Teen Volunteer program provides numerous ways for teens to gain experience in a healthcare setting. Volunteers perform various tasks with compassion, care, and support to the hospital's patients, staff, and visitors. Tasks such as blood bag deliveries, meal trays, specimen deliveries, and patient care are completed. As a way to be better involved in our community, club members took the initiative to use the volunteer community at SMH as an outlet to spread information about the PVBMES chapter. Individual members of the club have shared their experience and provided information about the purpose and goal of the club, and how to join. Due to this, our club managed to garner interest for STEM to our peers outside of Pine View. Members of the PVBMES club have volunteered at the hospital for a total of over 250 hours.

Sarasota Memorial Hospital Teen Volunteer Program	August 30th, 2020- May 28th, 2021 Sarasota, Florida	3 BMES members
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Audience: High School Students

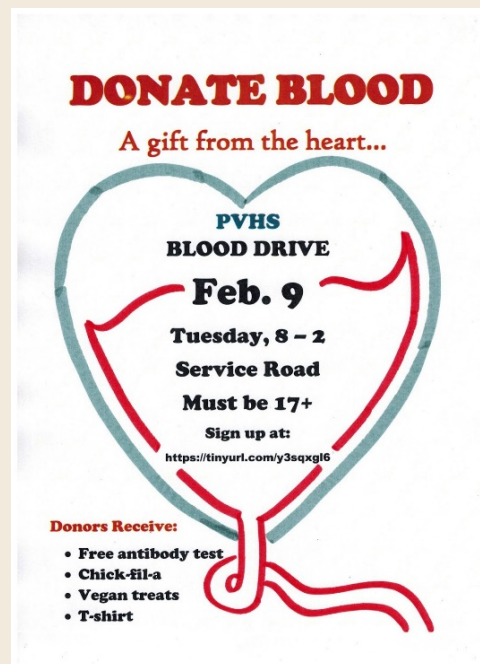
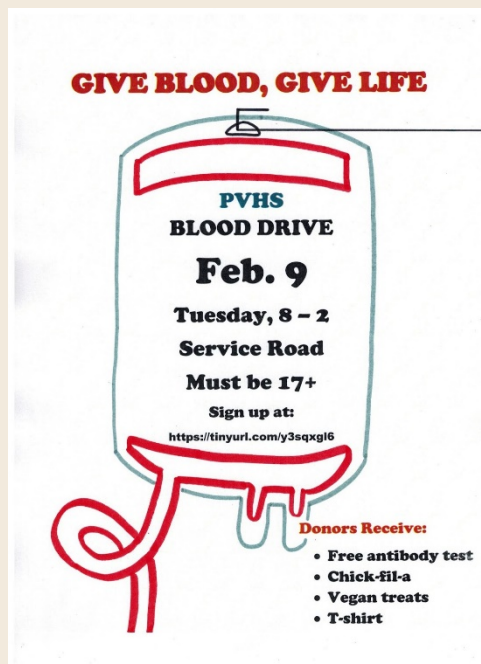
2. Organization of Blood Drive and COVID-19 Vaccine Drive:

The Suncoast Blood Bank hosts numerous blood drives throughout the year. Volunteers are expected to schedule appointments, transport donated blood, do data entry, and prepare marketing materials. Aiding in the organization of the blood drive provides members of the PVBMES club with opportunities to educate others about the club. Similarly, members who volunteered at COVID-19 vaccine drives this year aimed to achieve the same goal. At a vaccine drive, members took on the roles of the assisting staff. These jobs included traffic control, acting as greeters, vaccinator assistants, and non-clinical observers. Here, members of our club spread the word about what BMES is and how to find more information on it. Due to COVID, most of the outreach activities had to be performed on a smaller scale.

Suncoast Blood Bank Blood Drive	April 17th, 2021 Sarasota, Florida	1 BMES member
COVID-19 Vaccine Drive	May 8th, 2021 Sarasota, Florida	1 BMES member

Audience: High School Students

Blood Drive Posters



Volunteering



#smhVolunteersRock

X. MENTORING

This year, the PVBMES club organized mentoring activities through the Suncoast Science Center and through a professional, Dr. Winchester. Our chapter aims to increase communication with others in order to inform them on the STEM topics related to biomedical research.

i. Fab Lab Student Community Innovation Program (SCIP) and STEM Saturdays

Every year, the Suncoast Science Center selects a topic to present to the public. The goal is to identify a current issue in the community and try to help the public. The topic for this year is the environment, specifically, reforestation of a certain area in the Sarasota community. Members of our club actively take part in the reforestation by planting trees and using technology to keep the community involved. Technology is implemented through upcoming websites and social media platforms. Laboratory technology will also be used to create signage for the area. Members are also a part of STEM Saturdays at the Fab Lab, where mentors and mentees use high-tech Fab Lab equipment like the vinyl cutter, laser cutter, foam cutter, and more. Popular classes are robotics, engineering, chemistry, and coding. We work with younger students to aid them in exploring their interests in STEM.



ii. Dr. Winchester

This year, our club taught our members about research and how to properly conduct it. Dr. Winchester, (insert info on him), guided the club through the process. Due to his help, our club gave lessons on how to carry out statistical testing and analyze research papers. We also learned and taught how to present research the correct way. Additionally, our club explored AI and statistical modeling for propagation of disease.



XI. INDUSTRY AND PROFESSIONAL DEVELOPMENT ACITIVITIES

In order to further our combined experience and knowledge in the biomedical engineering field, several members had volunteered in many locations this past year. In combination with the annual project and side activities, students were able to unite their BMES pursuits with career development and general understanding of related topics.

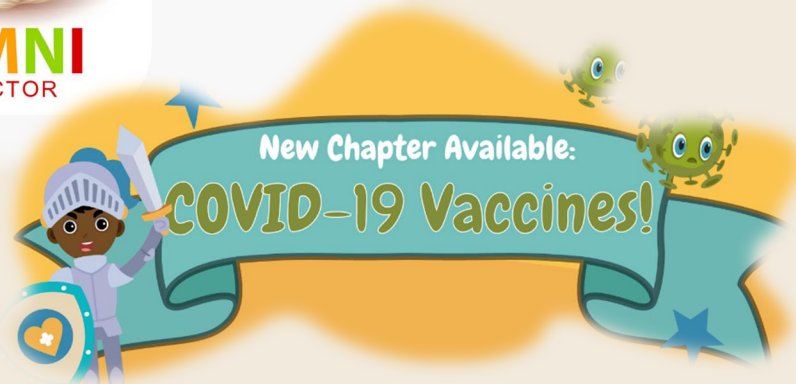
- Some have put in over 150 hours at the Sarasota Memorial Hospital, assisting nurses with daily activities and preparation of patients before seeing doctors. Others were involved with the Englewood Community Care Clinic and Englewood Community Hospital for around 80 hours, where they sorted patient files and medical charts (in addition to donating PPE). In accordance with the Pandemic and to reach out to the community, members volunteered at a COVID-19 vaccine drive at the Manasota Pediatrics for roughly 25 hours.
- Separately, certain students took a two semester long Biotechnology Course to develop their understanding of biological and engineering applications of the medical sciences. The class concluded with a Certification process with an exam administered under University of Florida's high school program to be approved as a Lab Biotechnician Assistant.
- Statistics courses were taken (supplemental, both in summer and during the school year) and paired with R programming language and Python for bioinformatics and integrative computational programs to compile biomedical data into graphs and trends.

XII. SOCIETAL IMPACT ACTIVITIES

Over the past year, the Pine View BMES club was able to engage with the community and make a proper societal impact through activities such as volunteering, training, donating, innovating, and serving in the biomedical and engineering environments around us.

During the pandemic, many free clinics were closed (some permanently). In Florida, most of the clinic staff are elderly, so there was an even higher risk of fatality for older volunteers. Most of the patients at these free clinics are of the indigent population, often uninsured and having no transportation. In order to circumvent this issue, 'OmniTelecare' was developed to allow a patient to contact their physician at home or work. The app allows for more communication between these two groups, while producing telehealth services (ranging from lab requests and medication refills to standard checkups). BMES was involved with this group as members had experienced this phenomenon of poorer patients having little access to medical care during COVID-19. Some were directly involved with the design and development. This platform is still in development, with a full fledged app coming out soon.

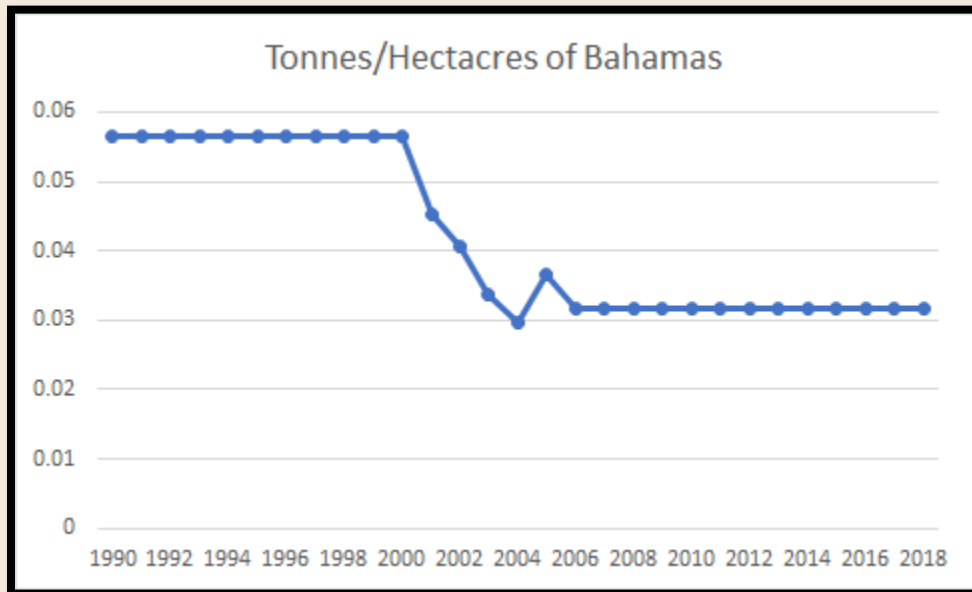
Other members directly reached out to society at the "Fab Lab" on Thursdays. At "COVIDucation.net", they joined in the effort to educate children on the nature of COVID-19 and viruses in general, connecting it to global response and policy as well as teaching how to protect themselves and those around them in these uncertain and dangerous times. You can find the website link here: <https://coviducation.net/>



Examples of goals that our club set for our members:

Steps before 3/30:

- 1) Find the amount of farmable land in hectares for your country
- 2) Use overall glyphosate data from <http://www.fao.org/faostat/en/#data/RP> for your country (under the column called organophosphate) (this should be in tonnes)
- 3) Spreadsheet → divide the amount of tonnes by the amount of farmable land for each year in dataset
- 4) Choose one of the cases above ** for your country
 - a) Number of cases over time
- 5) Find the total population in your country for each year in your dataset
- 6) Divide the number of cases by the respective total population



In addition to presenting our research at the National BMES conference, we also look forward to finding potential collaboration partners with whom we can host inter-chapter events. We will also connect with college BMES chapters to mentor our high school BMES chapter with their experiences. We would like to keep in touch with industry professionals that we meet at the event as well, potentially contacting them in the future for further mentoring and guest speaker activities. Our chapter's rewarding relationship with Dr. Winchester of Indiana University inspires us to connect with even more diverse mentors who can offer us their personal outlooks on niches of the biomedical engineering field.

XIV. FUTURE DIRECTION

- Goals achieved this year:
 - Continued to expand the club with new members
 - Completion of a glyphosate project with worldwide and national data
 - Succeeded in reach out to professionals in the field
- Further glyphosate project and legacy
 - Maybe able to include machine learning in analysis to make predictions about glyphosate use and effects based on area of the country
- More fundraisers and events when school is reopened in person
- More physical interactions with College BMES clubs
- Possible collaboration with other highschool bmes Clubs
- In-person would allow us to mentor elementary and middle school students at our school

Our long term goal for Pine View Biomedical Engineering Society is to expand to more club members and learn more about the industry and teach others about the STEM-related knowledge we know. To do this, we aim to increase the number and quality of the initiatives we accomplish through the committees we divide ourselves into.

There are a few future goals that the officers accomplished this year. Officers would like to increase the amount of activities, especially interchapter activities to recruit and maintain members. Officers wrote morning announcements that were played every morning reminding members and other students to join meetings on Tuesdays at 2pm.

Since the end of last year, we were unaware how long the current pandemic would last. Although we could not achieve some of our goals, we still were able to continue expansion of the club, and finish the project that we started at the end of last year. Our club expanded 4 new members, and was able to contact professionals such as Dr. Winchester from Indiana University to help us with our project to measure glyphosate use and effects based on machine learning models that input geographic areas of the country. Next year we plan on interacting with more College BMES clubs, especially ones from universities that students are interested in, and possibly work on projects with other high schools. We also plan on mentoring elementary and middle school students at our school.

