Coronavirus in Cafeterias

Salpointe Lancers
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The Challenge 2020
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PROBLEM

● “New Normal” created with Covid-19
  ○ Human contact is discouraged and social distancing is enforced
  ○ Cleaning required after any human contact

● Effect on schools
  ○ Schools need to have less congregation and more sanitation
  ○ More emphasis on staying home if you are sick
School’s Outlook on COVID-19

- “Salpointe Catholic High School cares deeply about the health and safety of our community. In these uncertain times, we are committed to educating our students while taking measures to help slow the community spread of the COVID-19 outbreak” -- Kay Sullivan (President)
THE LOCATION
CAFETERIA

- Used by students and faculty
- Challenge
  - Students are in close proximity to each other
  - Servers come in close contact with students
- Specifics
  - 5,000 to 6,000 square feet
  - Able to easily serve and hold 600 people
- Functions
  - Ability to accommodate the mass of students eating in the space
**SOLUTION**

- Design process
  - Collaborated to brainstorm ideas and determine the most efficient and impactful designs
- Final ideas
  - Plexiglass barriers, UV-C disinfection lights, and improved flow charts
- To implement our ideas we will work with faculty, students, and teachers

[Image of UV-C disinfection lights]

[Graph showing lamp output vs. effectiveness]

[Link to UV Data Sheet]

Ultraviolet-C Light Explanation

- 200 nm-- 280 nm
- Have been used in the past to eliminate both bacterial and viral infections
- Through Boston University, UV-C lights have been proven to be very effective at inactivating COVID-19 within short periods of time
- Some UV-C lights are currently being tested to eliminate viruses and bacteria without damaging human cells

**Solution**

- Fields of Engineering utilized
  - Mechanical, Biomedical, and Electrical

- Our solution is designed in a way to allow it to be utilized by others in different locations
  - Can be used by other schools and is not limited to just a cafeteria space
Designing the Solution

- Rectangular tables are able to seat 6 chairs.
- Large round tables are able to seat 8-10 chairs.
- Small round tables are able to seat 5-7 chairs.
- UVC Lights are placed strategically so the lights cover the entire surface area of the cafeteria.
PROTOCOLS & PROCEDURES OF SOLUTION

- **Entrance 1**: Directs traffic of students who bring “at home lunch.”
- **Entrance 2**: Directs traffic of students who purchase school lunch.
- **Exit**: By limiting the traffic to one exit it allows for facile supervision of the students exiting.
- **Tables**: Total of 50 tables which seat about 325-350 students.
- **UVC Lights**: 10 lights are placed throughout the cafeteria to disinfect surfaces and the air.
BARRIERS/LIMITS

- **Cost**
  - UV-C tubes
    - 10 units = $268.82
    - Sheet metal casing = $162.32
    - Ballast for wall connection = $250
    - 2G11 4 Pin Sockets = $84
    - Subtotal = $765.14
  - (For sustainability and environmental considerations all other materials will be recycled)
  - Plexiglass
    - 4 sheets = $131.12
  - Overall cost = $896.26

- **Equipment**
  - UV-C tubes (60 watts covers 645 ft\(^2\) in 60 minutes)
  - Sheet metal casing
  - Plexiglass
Effect of Solution

- Reduce spread of virus while allowing students to return to an on-campus setting
- Ethical considerations
  - Positive changes
    - Maintaining an on-campus environment for students
    - Eliminates spending money on cleaning supplies
    - Easy to operate and enforce
  - Negative changes
    - UV-C light is dangerous to skin if exposed (procedures will ensure no one is present during operation time)
- The function of the space will remain the same
Reflection on the Challenge

- **Successes**
  - Developed a way to keep students, teachers, and staff safe
  - Worked as a team and collaborated to discover the most effective and practical ideas
  - We were focused and on-task

- **Failures**
  - Technical difficulties involving Zoom
  - Not being able to access our chosen space in order to better picture and plan out our designs

- **Takeaways**
  - Learned how to prepare for a digitalized age and to adapt to new technologies
  - Learned how to collaborate on solving larger issues
RESOURCES


