



Coronavirus Challenging Classrooms

Engineering Safer Environments For Special Ed Students

Team 14

Omkar Arasaiah

Rishabh Guttal

Shri Sanjay Kumar Selvakumar

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Defining the Problem

What about COVID-19 is causing a “new normal”?

- Spreads easily through the air via droplets
- Challenging different aspects of our everyday lives such as in education and work environments
- No known cure

What effect is COVID-19 having on public spaces, specifically schools?

- Not designed to deal with a pandemic
- Tough to maintain 6 feet social distancing recommendation by CDC

Discussing the Location

Who uses the space?

- Special Education Classrooms: special education students and teachers

How does interaction occur in this space?

- One-on-one style
- Materials are generally shared between everyone

How big is the space?

- According to the NYDOE, special education classrooms will range from 450 to 900 square feet
- Similar to AZ

Discussing the Location

Identify a challenge in that space related to social distancing

- Students with various disabilities may require varying degrees of attention from the supervisor
- Forces staff to work closely with the student breaking the minimum six feet barrier

What features of the space need to be maintained to keep it functional?

- Security
- Emergency planning
- Noise reduction

Defining the Solution

What was your creative/design process?

- Modifying existing equipment and furniture to save money and time
- New layout to implement social distancing
- Model includes all equipment and furniture classroom
- Model abides with policies that ensure safety for all
- Model does NOT sacrifice quality of education

Defining the Solution

What did you come up with to adapt and update your chosen location?

- Contactless pathways are useful in work environments
 - Allows employees to move from place to place without using their hands
 - Creating “contactless pathways” in a school environment aids facilitation and health of normal students and disabled students in wheelchairs and other assistive equipment alike
 - Low resource and high impact solution
 - Upgrading existing features in the school and setting strict policies does not require as much time and effort compared to other solutions



Defining the Solution

- How will you implement your solution?
 - Multifunctional Furniture
 - Most if not all equipment and furniture will be used as barriers/dividers
 - Splitting of classroom using sensory stimulation areas separated from each other
 - Masks
 - Teachers will motivate students to wear masks using different techniques
 - Material of mask must remain breathable and comfortable without sacrificing safety
 - Contactless Pathways
 - Upgrades to existing technology
 - No need for contact with doorknobs or switches



Key for Model Classroom

Number	Item
1	Natural Sunlight Through Window (sensory stimulation)
2	Bookshelf with Barrier (activity space)
3	Modified Tête-à-tête Chair
4	Activity Panel Dividers with Plastic Wrap
5	Locker/Air Purifiers/Storage Units
6	Motion Sensors for Lights/Doors
7	Vertical Swing (sensory stimulation)

Defining the Solution

What types of engineers do you need to implement your solution?

- Electrical Engineers for installing lights switches, setting up door automation, and altering elevators
- Design Engineers to effectively implement our proposed model classroom in schools

What about your solution is innovative?

- Parents of special education students were initially against sending kids due to the pandemic
- Solution will allow kids to be taught well while minimizing health risks
- Cost-effective, easily executable, and safe for special ed kids in school environment

Discussing Barriers to Design Implementation

<u>Item</u>	<u>Price</u>	<u>Quantity</u>	<u>Total Cost</u>
Air Purifier	\$82.99	4	\$331.96
Vertical Swing Set	\$49.99	1	\$49.99
Automatic Door Opener	\$100 - \$150	3	\$300 - \$450
Automatic Light Switch	\$9.99	3	\$29.97
Activity Panel	\$179.99	1	\$179.99
Room Dividers	\$39.99	5	\$199.95
Plastic Wrap (4 Pack)	\$49.88	1	\$49.88
DIY Mask + DIY String	\$1.29	11	\$14.22
Grand Total:	N/A	29	\$1155.96 - \$1305.96

Discussing Barriers to Design Implementation

Equipment?

- Installation of equipment may require specialized tools
 - Outside the scope of our engineering solution
- Emergency supplies
 - First aid kits (thermometers, bandages, etc.)
 - Phone to call 911 for any medical emergencies must be readily available to the teacher or supervisor in the classroom
- Manpower
 - Necessary for designing, construction, maintenance, and running of the model classroom

Discussing how the Solution will Change the Space

Changes for stakeholders using the space?

- Solution is designed to change as little as possible for the special education students, while being effective at reducing health risk
- Teachers will be subject to new environment
- Proper care from teachers eliminates “strangeness” of situation for students
- Teachers will ensure all surfaces are kept sanitized often
- If changes are successful, situation will become new norm



Discussing how the Solution will Change the Space

Ethical considerations- positive changes and negative changes?

- Solution is designed to be free of negative ethical issues
- Wearing a mask is imperative for the classroom
 - Would be encouraged for students in calm, cooperative manner in the special education kids
 - Not be considered negative ethical change, but rather positive change that promotes cooperation and health

How will the function of the space change?

- Space would become more enclosed yet spaced apart
 - Properly contain the spread of droplets and pathogens and distance the people within the room
- Maintain the same level of education and discipline as before, while significantly decreasing risk of getting sick

Discussing What We Learned/How We Worked as a Team

Successes?

- All three members of our group contributed to the team's effort equally by:
 - Providing solution ideas and concepts
 - Searching, understanding, recording, and explaining research to other team members.
 - Writing material for project documents such as the Engineering Notebook and final PowerPoint presentation
 - Learning more about how special education is different from normal education and the details about the current situation due to the COVID-19 pandemic, which is something we did not have much prior knowledge about
 - Developing feasible solutions that could be used to help the current situation that special education faces during this period of time

Discussing What We Learned/How We Worked as a Team

Failures?

- We decided to scrap the negative air pressure idea because the resources needed, and the monetary costs outweighed the positive impact this implementation would have had on the classroom
 - Additionally, had we developed the negative air pressure idea more thoroughly, we would have had incomplete and less detailed solutions for the other three ideas as a result of sacrificing time and effort developing it



Discussing What We Learned/How We Worked as a Team

What did we learn?

- The importance of special education classes, and the difficulties the teachers and faculty face in day to day life to maintain the quality and style of education that the students receive
- The impacts of the coronavirus on students (especially special education students), their families, the teachers, and the faculty. Everyone has been impacted negatively by COVID-19, and we focused our design to mitigate as much of the negative effects as possible
- The psychological tendencies of special education students. Special education is an umbrella term for multiple different conditions that these kids face, and it is tough to design and create a classroom that is inclusive to students of all types and capabilities
- By implementing different types of furniture, sensory stimulation areas, and desk orientations, we made sure that the students would feel right at home (at school?) in a similar environment as they were present before the coronavirus pandemic while executing social distancing techniques and decreasing health risk



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