Horizon

Low Cost face Shield

Splash protective face shield for protection against Covid-19

Reusable N95 mask

Fabricated and 3D printed using poly lactic acid

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FROM THE EDITOR'S DESK

"Write what should not be forgotten"

–Isabel Allende

A magazine mirrors a college. It controlled the unravelled world of the most unforgettable and precious moments of the college. Another splendid year has passed with our students bringing laurels to the college all possible space they have put across some amazing pieces of writing displaying their creative thinking and writing skills.

The publication of this magazine included a lot of work and I was lucky to have a team of motivated friends in envisioning the layout of "magazine name". I hope that this magazine encourages many more students to use it as a platform to express their creativity.

I am thankful to all my colleagues and members of the editorial board for the whole hearted and end the support and cooperation. I take this opportunity to thank all entries for sharing their valuable time to send their best wishes to the magazine in the form of messages.

From the entire team of 'Horizon'

HAPPY READING

-Ajaysuryan P.A.

A Low-cost Preventive Face Shield and Reusable N95 Compatible Mask for Preventing the Spread of COVID-19

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Introduction

Recently, there has been a severe shortage in the global repository of personal protective equipment (PPE) stemming from the rising demand of gloves, face masks, and ventilators. This has left doctors, nurses, and other frontline health workers dangerously ill-equipped to care for COVID-19 patients. Most of the doctors and medical personnel are increasingly anxious, fearing they could expose not only themselves to the virus, but their families and others as well. Since the start of the COVID-19 outbreak, the price of N95 masks, gowns and other medical essentials has increased greatly. The research community is putting its best efforts to come up with novel solutions to tackle this problem.

To prevent further spread of the Coronavirus disease (COVID-19) pandemic, we present and discuss a cost-effective technology for developing personal protective equipment (PPE). We designed 2 types of innovative preventive measures at our SCMS Center for Robotics Laboratory: a low-cost splash protection face shield and a reusable N95 compatible face mask. In this article, we present and discuss the technical details behind the development of these two pieces of equipment, and sincerely hope that this can be replicated at other fabrication laboratories around the world so as to help in preventing further spread of the Coronavirus disease.
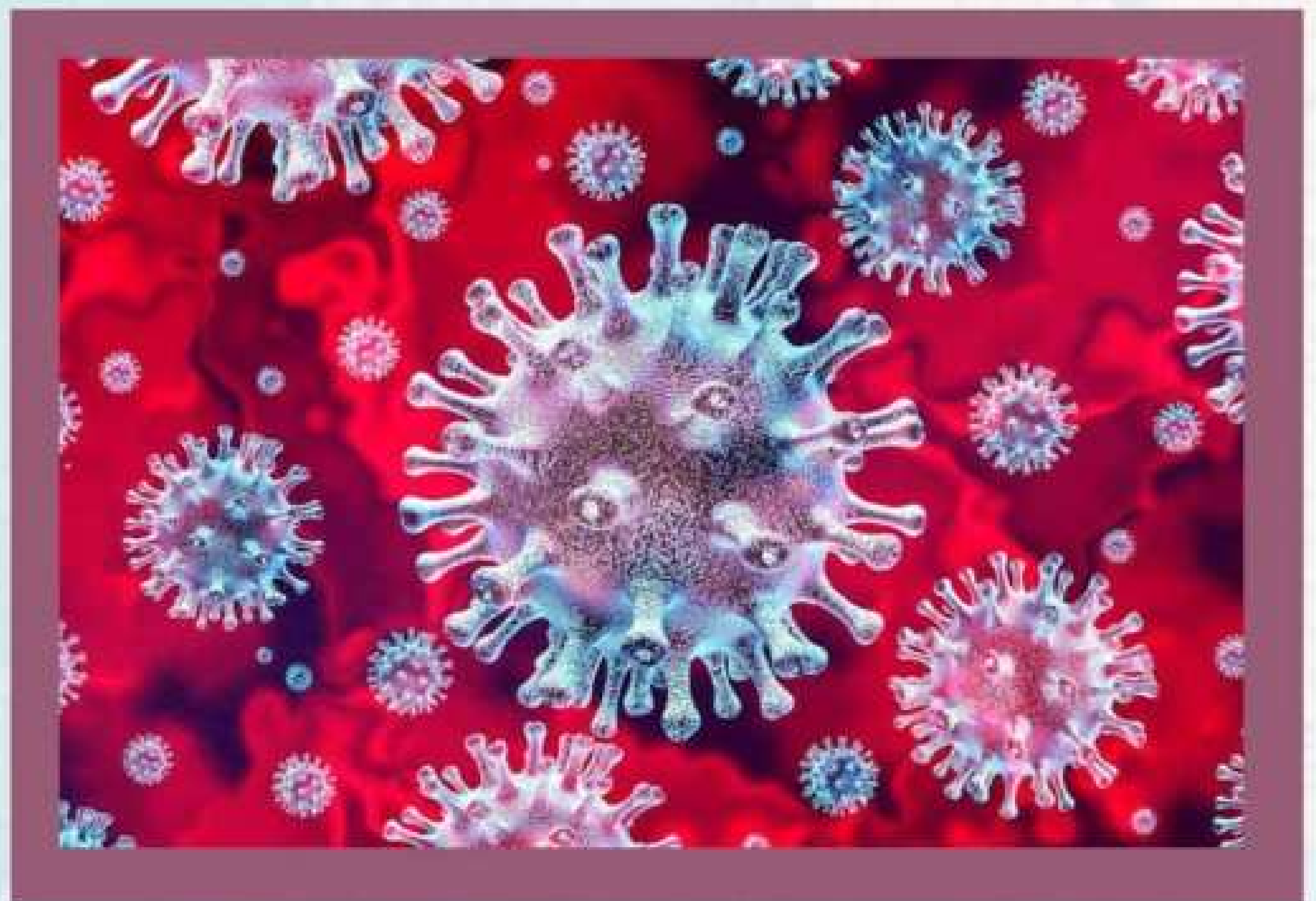
LOW-COST SPLASH PROTECTION FACE SHIELD

THIS SHIELD PROTECTS MEDICAL PROFESSIONALS FROM THE BODY FLUID OF A PATIENT, AND WHEN USED IN CONJUNCTION WITH THE OTHER PPE, COMES UNDER THE CATEGORY OF ADJUNCTIVE PERSONAL PROTECTIVE EQUIPMENT.

One of the major hazards faced by doctors and other medical professionals is protection from liquid droplets through sneeze and cough. The shield designed here provides adequate protection to medical professionals from such body fluids of a patient. A low-cost splash protection face shield was laser cut using Epilog 40W laser cutter and fabricated. The sheet used for this was 3 mm acrylic of dimensions 610 x 305 mm. The specification for cutting was 600 dots per inch, frequency of 5000 Hz, speed and power for 40W was set to 12s 100p. Autofocus was set and by adjusting the standard focus distance to 0.762 mm, the sheet was set closer to the laser gun to get better edge quality.

Also, two passes of the laser gun produced better results and allowed deep and precise cutting through thicker material. This shield protects medical professionals from the body fluid of a patient, and when used in conjunction with the other PPE, comes under the category of adjunctive personal protective equipment. The major advantages offered by this shield are its low cost, it can be worn with face/eye PPE, communication is not impeded, patient anxiety is reduced, it covers a wide facial area and it can extend the use of other PPE when used in conjunction with them.

Figure 1

The low-cost splash protection face shield fabricated at our laboratory

DESIGN AND STRUCTURE

The face shield design and structure are in accordance with the International Safety Equipment Association (ISEA) standard. As per the standard, the visor, also referred to as lens, can be manufactured by polycarbonate, propionate, acetate, polyvinyl chloride or polyethylene terephthalate glycol. However, acetate provides the best clarity, and hence we use OHP sheet which is made of acetate. This material is preferred because it is easily available, inexpensive, more resistant to voice and has good visibility. The frame, which should be made of plastic material, is made using acrylic of 3mm thickness and is light weight. For the suspension system, we are using elastic strap as recommended by ISEA/AST. As it is a class two medical device, there is no predefined standard for it. The body of the mask can also be made of cardboard covered with a vinyl sheet which would make it very cheap and light weight. Figure 1 shows the face shield that was fabricated in our laboratory.

REUSABLE N95 COMPATIBLE FACE MASK

A reusable N95 compatible face mask was fabricated and 3D printed using Poly Lactic Acid (PLA) in Ultimaker 2+ 3D printer9. The PLA material used is biodegradable and biocompatible. The settings for Ultimaker+ 3D printer include: the nozzle diameter was set to 0.4 mm, the profile was selected fine, and the material was PLA with infill of 50%, and generated without support materials. The mask is designed in three variations: large, medium and small. When worn, it covers the nose and mouth and is airtight. The filter in the mask can be removed and replaced periodically. The filter is made of four layers. The first layer is just a protection layer for the face. The second layer is an electrostatic non-woven layer that filters fine particles and blocks contaminants (the material can also be used as MERV-13).

The third layer absorbs moisture vapors from air while inhaling and exhaling. We can use spun bound or melt blown cloths for this. It is anti-dust and anti-foaming. The fourth layer possesses high anti-viral activity and blocks influenza virus. This provides 95% accuracy with 0.3 micron. This can be soaked in citric acid, dried and disinfected, and then be used as the separator. An elastic band is used for the tightening strap. The cost incurred in fabricating the face shield is approximately $2 USD, and for the N95 mask is $3 USD. The whole structure of the mask can be sterilized and reused. The filter layer needs to be replaced, and the lifetime of the mask is similar to the standard N95 masks. Currently the mask is under testing at a hospital. Figure 2 shows the design and the fabricated N95 mask.
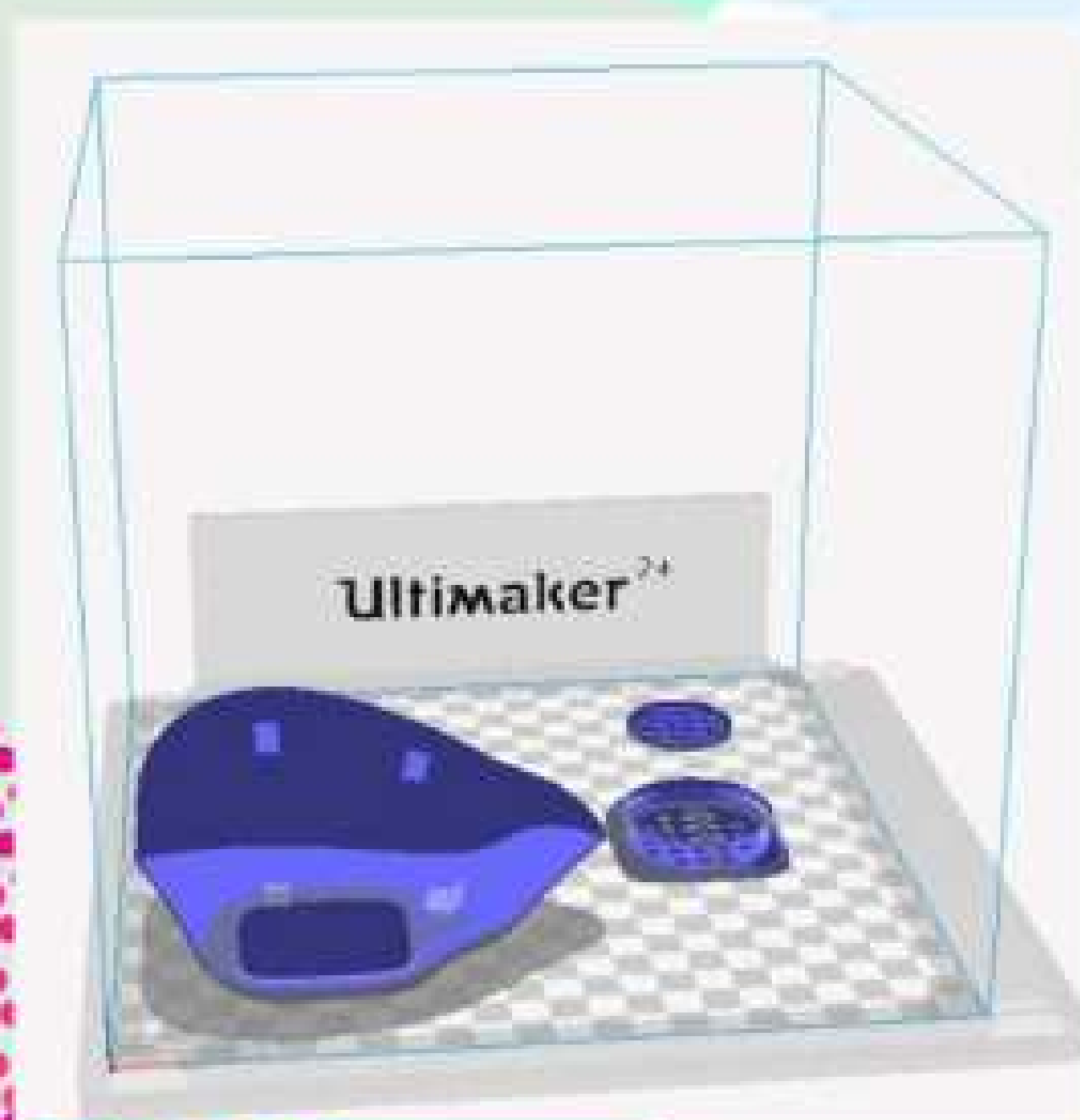

Figure 2: Reusable N95 compatible face mask
a) Design b) Fabricated product

BOND

By Arya Anil Kumar

Seems naive for sense organs
But deeply sensed within
Traverse beyond distance and time
This eternal bliss
Stretches shrinks twists and turns
But kept intact with love
Be it crest trough storm or calm
It gets sensed and beheld
Scars turn into the stars
In thy single artful soul
Learn grow rise and evolve
They do it as a whole
Finding sunshine at the peak
And mines at the core.

BACK TO NEW NORMAL
COVID - 19 IS OVER

POST COVID LIFE

The Covid-19 pandemic has turned lives upside down in so many ways. From lockdown, social-distancing to working from home, online education, our daily routines have been completely overhauled. After Lock-down, people are using masks and they embrace contactless greetings like "Namaste" and we also started using sanitizer on a regular basis, and also hand washes .Real-time online classes were also held.

Covid-19 has demonstrated The importance digital readiness, which allowed business and people's life to continue as usual during pandemic. Technology had a great impact on us .Technologies used in distant learning which includes augmented reality, artificial intelligence etc. Contact tracing apps have assisted in tracking the coviD-17 spread .Technology hat also helped in educating people about the entire situation and reminding them to take necessary steps precautions, as " precaution is better than cure". Facial cognition technology has helped an identifying people accurately even when they are wearing a mask.

Covid -19 has resulted in a strong push to implement the usage of robots and also speed up the robotics research . Robots are now being used to clean infected areas and for delivering food to quarantined individuals .Drones are being used for food delivery, tracking population, transporting test kits, spraying disinfectant and also for delivering medicines to quarantine etc. Infrared and wireless thermometers have now become the most commonly used medical equipment at toll gates, entry exit gates of offices , Shopping malls, shops, hospital etc.

After covid life would be e more like hands free not by touching anything but can implement it. Many innovations were we made during covid-19 pandemic like door opening covid tool, temperature screening at entry-exit gates of some places, hands free sanitizer dispenser etc. Like there is saying of "There is light at the end of tunnel " , let the end of covid-19 pandemic bring joy to everyone, by staying positive minded at times also helps in health. Being healthy with physically and mentally are important to overcome the pandemic. At the end, covid-11 pandemic teaches us a lot. keeping that lessons, we can strive for better coming days, as life goes on ,lets live on. As people work together in breaking the chain of coronavirus infection, a better world is emerging. People have realized the need for precautions and are taking steps against future contingencies, to keep the coming generations safe.

By Anjana Sanjay

IMPACT OF COVID 19 ON EDUCATION

Education is the basic necessity in the human life. The real meaning of education is leading, which awakens the conscience of human being. Now education is completely changed from its original meaning or we can say that education is connected to earn money. Morality has no connection with education. education swigs own professionalism.

Everything was going well but suddenly it stopped due to the Corona pandemic. Parks, restaurants, hotels, shutted down. Buses, trains, airplanes, taxis, all closed. Most governments around the world have temporarily closed educational institutes, in an attempt to control the spread of COVID-19 pandemic. People are locked within the Walls of their houses. Many examinations were postponed or rescheduled.

Then when it felt that everything had become too much wierd and unusual, online classes started. The pandemic has sufficiently disrupted the education system. Schools and colleges in which it was prohibited to keep mobile now started conducting classes through mobile and Internet. The whole world shrunk between mobile and Internet. Zoom app, Google classrooms are used to teach. Children started studying in front of mobile and laptops for many hours often leading to eye strain and headache. In such process only of a handful of private schools could adopt online teaching method and on the other hand government schools completely shut down for not having access to e-learning solution. These students missed the opportunity for learning.

The best part of corona pandemic is that, for the first time in all these years,all family members were together. Education is more important that the examination. Education for morality should be given at home which cannot be given in any real or virtual classroom.

In this time of crisis, a well rounded and effective educational practice is also needed. It will develop skills that will drive their productivity, health, well being and ensure the overall progress of India

By Chandini PS