

We must address the issue of plastic waste to avoid another pandemic

Personal protective equipment (PPE) which comprise of gloves, masks, cover-all, etc. are all essential items in our fight against the coronavirus. However, they may also become contaminated after use and their disposal is a matter of grave concern. Dr Mubarak Ahmad Khan's latest innovation, now at the conceptual stage—a biodegradable, non-toxic material to make PPE (cover-all) which can easily be discarded without causing any harm to the environment—is a game-changer. Not only will his innovation address the urgent need for more eco-friendly PPEs, but it will also help in disposing them in a safe and environmentally friendly manner, thereby reducing the risk of further infections. In this interview, Dr Khan talks to Minam Haque of The Daily Star to discuss his latest innovation.

What inspired you to create biodegradable, non-toxic personal protective equipment (PPE)? Can you discuss the process of how it is made?

The concept of creating a biodegradable cover-all was well in play even before the pandemic struck. In October 2019, a hospital in Japan asked me about the viability of producing biodegradable gowns for their ICU usage, which I made using polymer from jute fibre and they accepted it enthusiastically. They even requested for more gowns and other similar products in bulk, but being a scientist, I was not able to meet their commercial demands.

Plastic waste is usually incinerated (for disposal), but that results in harmful carbon emission which is a threat to climate change. Much of the plastic waste also tends to end up in the water bodies, affecting the aquatic ecosystem as well as clogging the drainage systems. The environmental degradation that results from plastic pollution has always been a matter of great concern globally, and for me as well, even more so during the ongoing pandemic, and hence, I decided to work on techniques that could help address such issues, based on my earlier invention—the Sonali Bag.

The guidelines set by The World Health Organization (WHO) to dispose PPEs is a lengthy and costly process, whereas with my innovation, the cover-all dissolves in soapy water within three minutes and it also disintegrates in plain water within seven days. I also noticed that corpses of Covid-19

positive patients were wrapped in sheets of plastic prior to their burial. It occurred to me that the bodies will decompose within a few months, but the plastic sheets won't. Therefore, my biodegradable material can also be used to make shrouds for dead bodies.

Coming to the non-toxic aspect of my invention, I had already extracted chitosan—derived from the exoskeleton of shellfish which are collected as by-product from shrimps and lobsters that are exported or consumed in restaurants—which has antimicrobial and antiviral properties. I have conducted extensive research on it too. Chitosan can also be used as a harmless preservative in fruits, vegetables, and fish keeping the taste and quality intact. I just combined my two innovations together—using jute cellulose and adding chitosan—and was able to come up with the concept of a biodegradable and non-toxic PPE.

In what ways does your PPE differ from those that are available in the market today? How do their usage and prices vary?

First and foremost, both the cellulose and chitosan used in my PPE are 100 percent natural. It has been reported by many that wearing the PPEs (cover-all) available in the market today is no easy task as they are non-porous, meaning it cannot be worn over lengthy periods. However, my cover-all is much more comfortable to wear. I am yet to standardise the porous factor of it because there aren't any appropriate labs to conduct



Dr Mubarak Ahmad Khan

the necessary testing to make sure that it is safe from the tiniest forms of coronavirus. What sets my cover-all apart from those available in the market is the fact that it has antimicrobial and antiviral properties, making it the safest choice.

As for the pricing factor, an authentic (there are plenty of replicas in the market) disposable WHO approved PPE (cover-all) costs approximately Tk 1,400, whereas the one I produce would cost around Tk 320-340. As I have said earlier, it is also much easier and efficient to dispose the biodegradable PPE and is free from any risk of infection.

Being a fairly new discovery, where does it stand now in terms of mass production? As

there is a high demand for PPEs globally, do you see any opportunity to export it to international markets?

I have produced the material in my lab on a small-scale using machineries that I built. My production capacity might be appropriate for providing to the local market. But as for meeting the global demand, that is far beyond my capacity. I can only do so much as a scientist. Mass production is only possible if I get assistance from the state or if other entrepreneurs decide to step in and expand the production process. I can provide all the know-how and the technology, but the rest is up to them.

Moreover, jute is a tremendously promising plant in terms of its harvesting time, the amount of cellulose it can provide, the durability of the materials made from it, etc. Not only will the export of the PPEs be beneficial for the overall economy of our country, but if mass produced, it will elevate the jute cultivation in our nation which will also have a remarkable positive impact on our carbon footprint.

You gained international acclaim after inventing the ground-breaking Sonali Bag. What is its status today?

Well, it's a slow and steady process. Sonali Bag is being produced on a limited scale at the moment. We are also sending samples to various countries around the world, and there seems to be a demand for it. However, like I mentioned, there is a lack of force to make it commercially successful. The fact is,

it will require a few hundred crore taka to get the project running on an industrial scale. If the capital can be arranged or is provided for, then it is very possible to mass produce and export it globally.

Your inventions seem to address the concern over plastic pollution in a promising manner. What steps need to be taken in order to fully facilitate the mass production and usage of such products?

I have already manufactured the product, but it now needs to be certified by a recognised body like the WHO in order for everyone to consider my PPE as a standardised product. In order for that to happen, more extensive tests need to be conducted by those who will certify it. And that can be achieved either through government intervention or if I receive enough funds to carry on with the necessary procedures. Once that is done, many might be interested to take on the production on a commercial level.

Despite having my product in hand, I did not make any announcement publicly until recently, following the acceptance of my concept by the Massachusetts Institute of Technology (MIT) in the US. With their approval, I can conduct more research at icddr,b to start the clinical trial of the product and so on. We are also going to test the new concept at Shishu Hospital soon. We already lag in our fight against plastic pollution. If we do not immediately address the issue of plastic waste from PPEs, we may soon face an epidemic as a consequence.

Pandemic Pedagogy

Teaching compromised or redefined?

MOHAMMAD SHAMSUZZAMAN

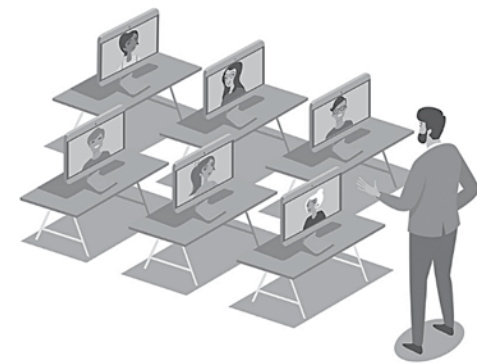
THE Covid-19 pandemic has altered all of our professional beliefs and behaviours. I used to believe, for example, that teaching is a flesh-and-blood experience and that human interaction is essential to education. When I shifted to online teaching in March this year, my teaching was reduced to speaking to a screen. I assume that my students exist. My students assume that I exist. We assume all together that the university exists. Beyond assumption nothing seems to exist besides disruptions and depression. Every time I get down to teaching online under such circumstances, an existential threat overcomes me.

The pandemic confirmed what I already believed—teachers are professional pariahs. We claim smugly that teaching creates all other professions. That's a delusion! As governments worldwide ease or lift lockdown, they resume "essential services". Teaching is not deemed an essential service, so educational institutions operate virtually while everything else has started operating physically. This implies that education operates under a political, economic, and somatic cushion. Education is not considered critical to retaining and sustaining stability when politics, economy, and safety falter or fail. Education is at once a burden and a luxury without any redeeming potential. No one seems to need an education for ethical, empirical and enlightened engagement with reality. Investment in education is optional these days to maintain the status quo. Education solves no problem, because education is a problem. Teachers have created and compounded that problem, sceptics speculate. So, what do we need teaching for?

That question becomes serious when we fail to show the connection between the courses we teach and the future our students want to forge as an outcome of education. The coronavirus has already devoured our future. We're in an unprecedented chaos. The whole world has become a theatre, where almost everyone is a potential virus bomb

waiting to explode. As such, no one commits to enlightenment for himself and others—everyone waits for a vaccine. We're hurled into an uncomfortable, eternal present. With every passing moment, reality shifts. Education prepares us for reflection and research, for informed engagement as reality unfolds as we expect it to. But ours is a surreal world, where reality is transgressive and transient. However we teach—whether technically synchronous or asynchronous—is anachronous. And whatever we teach falls between the cracks without connecting the present with the future. Such a situation impeaches teachers.

It is irrational to place teachers in a position where they are expected to dispense altruism wholesale. Teaching is not a charity. Teaching certainly embodies love, but that's *tough love*. When, however, the time is



already tough, it doesn't behove a teacher to become tougher. The pandemic has displaced students along with making them financially vulnerable. For example, a recent survey by the Healthy Minds Network for Research on Adolescent and Young Adult Mental Health and the American College Health Association of 18,764 students from 14 campuses in the US reported that 60 percent of the students claim that the pandemic has caused them financial stress.

This finding in the US resonates with Bangladesh, too. A survey by the Bangladesh Economic Association reports that 66 million

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people have lost their jobs in the first 66 days since the closure was imposed nationwide in March. That may have depleted—even diminished—the sources of funding some students used to depend on to facilitate their studies. Additionally, some students have been flung so far away that they have limited and intermittent access to the Internet. Some students have neither a desktop nor a laptop computer. They only have a smartphone, which is not enough to participate actively in an online class. None of these problems are the students' fault. They are just the victims, whose performance and creativity are adversely affected. When these inconveniences of students factor into teaching—grading, in particular—teachers might prefer kindness over intellectual rigour. But there's an element of compromise in such an equation, however humane it is.

Financial crisis, displacement, and adjustment to the new format of teaching are psychologically consequential for students. Teachers can't help students deal with the psychological problems caused by the pandemic. Teachers are not counsellors. Teachers are meant to ensure students' intellectual well-being. Effective teaching presupposes mental stability, but the

pandemic has severely disrupted students' mental health. For example, a survey co-led by the University of California, Berkeley, Center for the Study of Higher Education and the University of Minnesota, in which 46,071 students from nine different institutions from the US participated to answer questions on their mental health from May to July, reveals that 39 percent of students screened positive for anxiety disorder.

In Bangladesh, the situation is worse even under normal circumstances. A study by Md Saiful Islam and others conducted on 400 first year students from a public university published in March 2020, in the "International Journal of Mental Health and Addiction," found that about 70 percent of students suffer from severe to extreme levels of depression. Had they conducted the study during the pandemic, how much more would most of the students have been depressed? Depression management critically defines teaching during the pandemic. That worries and limits many teachers.

Given all these forces and factors that permeate the landscape of teaching during the pandemic, some teachers might suffer from what Steven Pinker dubs in *The Sense of Style* the "illusion of good old days". What people euphemistically call "online teaching", they would like to call "emergency distance teaching". They're not convinced that this is teaching at all, because coming together in real time and space is fundamental to teaching. Teaching is not about providing specific content knowledge only. Teaching is also about coming together to share ideas, to forge long-lasting connections, and to think critically through debates and discussions as to what it means and takes to be human. Thinking presupposes engagement and interaction. A university is the biggest and best site for real-time engagement and interaction. That's the university we had! Distance and disconnection invert the very definition of that university. In such an inverted university only zombies and cyborgs fit. And it's the only university that exists now. Some teachers are not comfortable in teaching at

such a university, because it fundamentally compromises the content, rigour, and principles of teaching. I hate to break it to you but I also fit into that mould.

The pandemic has drained me as a teacher. I've scrambled to do things that I hardly had preparation and expertise for. I've also realised that the pandemic has stretched me as a teacher. The last several months have been pedagogically invigorating—as I have been pushed out of my comfort zone to search for and experiment with new approaches to teaching. As the pandemic still seems relentless, debates and discussions have been shifting away from on-site versus online teaching into how we can best serve our students under such circumstances. It seems that we need more of everything—resilience, compassion, and technological literacy—on top of our intellectual capital to teach during the pandemic. Most importantly, we need to refuse to be ceaselessly borne back into the past to mourn the loss of perfect teaching in a perfect world.

The world has always been messy, with or without the pandemic—teaching has been even messier, on-site or online. Let's admit that! Some teachers do consider the pandemic a blessing, to redefine teaching so as to make it more encompassing, pragmatic, and effective. I again have to break it to you that I'm one of those teachers.

If I sound paradoxical, well, aren't we indeed in a paradox? Our actions and reactions are at once rational and radical as we weather the pandemic. We've seen how an absurd phenomenon—that is, online teaching—has become at least temporarily inevitable. The pandemic has spawned a complex teaching scenario that simultaneously compromises and redefines teaching. Therefore, the question that I posed at the beginning of this pitch is a rhetorical one, that asks us all for more reflection than for resolution.

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QUOTABLE Quote

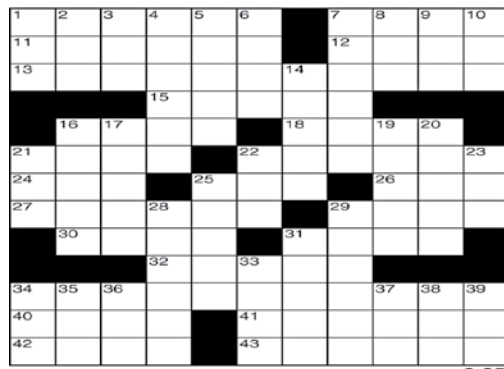


JANE ADDAMS (1860-1935) American social reformer.

Of all the aspects of social misery nothing is so heartbreaking as unemployment.

CROSSWORD BY THOMAS JOSEPH

- ACROSS**
- 1 Circle and square, e.g.
 - 7 Job for a gumshoe
 - 11 Writer Welty
 - 12 Like some radios
 - 13 Four Seasons hit
 - 15 Skilled
 - 16 Volcano shape
 - 18 Spheres
 - 21 Dictionary entry
 - 22 Reporting coups
 - 24 In the style of
 - 25 Derisive cry
 - 26 Humor
 - 27 Cheering call
 - 29 Feel sorry for
 - 30 Bird abode
 - 31 Merriment
 - 32 Beach setting
 - 34 Response to unwelcome advice
 - 40 Overly suave
 - 41 Wild parties
 - 42 Betting info
 - 43 Relaxed
- DOWN**
- 1 Put in stitches
 - 2 "What'd you say?"
 - 3 Fuss
 - 4 Warsaw's nation
 - 5 Eat away
 - 6 Rescue
 - 7 Big name in Havana
 - 8 Writer Tan
 - 9 Bay Area airport code
 - 10 Outback bird
 - 14 Historic period
 - 16 Two-dot character
 - 17 Make a speech
 - 19 Rocker David
 - 20 Ill will
 - 21 Funny fellow
 - 22 Drod's friend
 - 23 Pig's place
 - 25 Spa features
 - 28 Emerson works
 - 29 Take an oath
 - 31 Terrific
 - 33 Gumbo veggie
 - 34 Court
 - 35 Stashed
 - 36 Outdated
 - 37 Backer's vote
 - 38 Hosp. parts
 - 39 Try out



YESTERDAY'S ANSWERS

R I F F S U T T E R
I D I O T L E A V E
M O T O R Y E M E N
T U G S E N D
M I S H M A S H
A N T I B E A S T S
S C U L L E D S N A I L
T A B L E D D I M E
P E P T H A I
O X I D E C L A S H
S P E A R A L B E E
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