

The Classroom Re-Imagined and Re-Designed: The Pandemic-Ready Teaching and Learning Station

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Abstract

Save for the most callous among us, all of humanity knows the chaos wreaked upon the world by the Covid 19 Virus. The losses are of unspeakable proportions. Those losses continue. Among those losses is lost educational opportunity for our children and young adults. The debate among world experts continues unabated: when should we re-open schools? At what levels? Under what conditions? What are the potential perils? How do we assess the effects of viral mutations and variants? There is so much that we have yet to learn that, at best, we are making educated guesses; at worst, we yield to denial and despair.

This paper charts the efforts made by various countries to deal with the impact of education on schools, colleges and universities. Given the vast differences in resources; the availability of medical and other expertise; innovativeness; and political will and the humility of political leadership to follow the advice of scientists, the responses have been markedly different. Not unusually, the poorer the country, the greater is the suffering. In this paper, we use Guyana as representative of nations bereft of those things we have just mentioned.

However, even in nations that are blessed with the wherewithal for managing and minimizing the impact of this deadly pandemic, education has suffered. In poor countries, this damage may be almost irreparable for decades to come. The overall international quest has been to find a way to re-open educational institutions safely. Outside schooling, social distancing, hand-washing, and the wearing of masks have been vital ameliorating tools. Some places have used plexiglass to separate students and prevent the exhalation and inhalation of droplets. Other countries have simply followed uncritically what richer and more resourceful countries have done. Many countries have simply denied the fact of the pandemic or have simply guessed their way along. Denial and guess-work have lead to catastrophic results.

In this paper, we have attempted a solution that involves the re-imagining and re-designing of the traditional classroom space into being a **Teaching and Learning Station**. This innovation, in our opinion, almost guarantees the safe re-opening of schools. It ensures the safe return to in-person teaching and learning, and it prepares us for inevitable future pandemics. We have offered up the design with the hope that it may be taken up and acted upon.

Keywords: Covid, pandemic, teaching, learning, classroom

1. Introduction

The entire planet has been stricken by a new virus which continues to cause millions of illnesses and deaths in the earth's human population. As we write this, there have been almost 30 million cases and almost 1 million deaths. The COVID-19 virus continues to wreak destruction hitherto unseen since the 1918 Spanish flu, and the best global medical experts continue to work themselves literally to exhaustion, illness and death in order to understand the genetic make-up of this virus, to see how this virus is spread; to ascertain the demographics regarding susceptibility; to assess where and why they are the most susceptible; to study the forms symptoms take; to assess the health damage to those who have recovered from the disease; to see what remedial steps can be taken to avoid people contracting the disease, and to find an anti-viral to attack the virus. Preventative measures have been established world-wide, but these are tragically inadequate to curb the spread of COVID-19. This is true not because prevention is unnecessary, but because there is much more to be done after preventative measures have been taken.

The COVID-19 Pandemic has had and is still having a devastating impact on every area of life globally. The impact is being felt keenly in all sectors of education everywhere, and even the greatest experts are at a loss regarding how to react to ensure the health and well-being of students, teachers, and staff. The conventional or traditional classroom does not and cannot ensure that all the necessary safety measures are implemented. The classroom space must be re-imagined and re-designed; yet, no country in the world has thus far arrived at a creative alternative to the traditional classroom. This Project seeks to make an initial step, albeit a tentative one; it establishes and offers up a change from the traditional classroom set-up and replaces it with the **Teaching and Learning Station (T&L Station) that would allow for the safe return to in-person teaching and learning for COVID-19 and all future pandemics.**

This highly contagious air-borne and air-transmittable COVID-19 Virus has already killed more than one million people worldwide; it has already infected 30 million more. The few countries like the Scandinavian countries (Switzerland, Denmark, Norway, and Finland, excepting Sweden), South Korea, New Zealand, Taiwan, and Canada acted swiftly and efficaciously to contain and mitigate the Virus since it became known in 2019. Most other countries ignored the facts and warnings, took no action, and are paying a heavy price in lives lost, life in abeyance, and in crushed economies. No sector in any society anywhere is exempt: health systems (where they exist) are over-run; educational systems at all levels have ground to a halt, on-line classes notwithstanding; unemployment is rife since businesses are adversely affected; borders have closed; transportation is practically non-existent.

Schools, colleges and universities have suspended face-to-face instruction in the vast majority of countries, excepting those few countries that have acted expeditiously and effectively. The situation has become tragically extreme in those countries that have foolishly politicized the Corona Virus: the once-mighty USA and Brazil, for this reason, are the worst affected, with the highest positive cases in the world. Ironically, America is the richest country in the world; Brazil is the richest country in South America. Leadership in these cases has been replaced by callousness, brutish ignorance, and stupidity. This deadly Virus has changed our world forever; yet, in these two countries there is still no coherent National Plan.

The dreadful impact of this Pandemic on the global economy is yet to be estimated fully, but global economists are agreed on one fact: that it will take national economies decades to recover, if ever they do. There are already signs of a global recession according to the World Bank and the International Monetary Fund (IMF). Economically, even rich countries are contracting at alarming rates, and one is left to wonder about the fate of desperately poor countries such as the one in which we live. How then are we to survive with our habitual dependence on aid, our complete lack of innovation and creativity, our consumer-oriented thinking, our lack of expertise in any field, and our ridiculous complacency? We hardly have a health care system; we have an ancient education system; we have a dilapidated infrastructure; the highest suicide rate on the planet; stunning rates of unemployment; a stunning illiteracy rate; we have endemic power outages for no reason whatsoever; and there is no evidence of meaningful research being undertaken.

Elsewhere, the quests for an anti-virus and for therapeutic medicines have accelerated medical research to incredible speeds. Worldwide, thousands of medical doctors and medical researchers of every conceivable field—psychologists and psychiatrists, sociologists and linguists, writers and technologists—all are working day and night to save our lives. The most worthy universities and colleges on the planet have mobilized their expertise in all ways to bring relief and to end this horror. In countries like Guyana, we do not have the simple decency to acknowledge or even fleetingly mention any name of those who are doing the work of saving lives including ours; the difficult work that we cannot do and will not do here. We simply wait to reap the benefits. Thankfully, with new political leadership in Guyana, there are signs that we are awakening. We already hear of Task Forces, but we must keep in mind that task forces are only as good as the people who comprise them. We do not have the luxury of endless circuitous and protracted consultations that lead only to bulky reports and little meaningful action.

Of immediate relevance to this original research initiative is the fact that education has suffered and continues to suffer in extreme ways. Professors, teachers, administrators, staff, businesses, school boards, governments, and Foundations are engaged strenuously and almost single-mindedly in trying to find ways to re-imagine education and the classroom, in particular. For those who bother to be aware and those who actually care about anything outside of themselves, there can be no more worthy preoccupation. We know that the great majority of schools globally are physically closed for fear of spreading the virus thereby preventing further debilitation, illness and death. Students are at great risk, as are teachers, parents, grand-parents, and all concerned in schooling at all levels globally. Here in Guyana, the same worry prevails, but there are but few visible remedial initiatives. We simply follow: we close schools because elsewhere and everywhere, schools and universities are closed. We simply follow, without any kind

of critical look at ourselves. We will inevitably re-open our educational institutions when others re-open theirs. We are yet to learn to compare and contextualize according to our circumstances, and the consequences are dire should we fail to create and implement policy-driven mitigating ideas.

In Asia (strangely, excluding China, where the Covid 19 started), Africa, South and Latin America (Brazil, especially), and the United States of America (of all places!), hospitals are so overwhelmed that medical doctors are forced to do the unthinkable: they have been made to send critical Covid 19-stricken patients home to die. In the USA, bodies are so many that they have to be ignobly dumped into freezer-equipped trucks. In Brazil, mass graves are the order of the day, with no end in sight. The sheer ignominy and shame of it; the sheer scale of it; the sheer tragedy of it all.

Those of us, who lay claim to teaching—even by interactive technological platforms through our computers or cell phones, if we can afford these—are morally obliged to be sharply aware of the unprecedented circumstances under which we teach and under which we expect others to learn. It is indictable if we just “do” courses on-line without recognizing where we are. Why are we teaching and learning on-line, what physical, mental, and pedagogical adjustments need to be made, what considerations need be taken into account? How does remote teaching and learning affect students and teachers? How have familial and social conditions been impacted? In Guyana, teachers from kindergarten to the university level must be aware of very basic things: do all students have cell phones or computers? Do they all have connectivity? Can they afford it? Do they have electricity? If, as a teacher, one establish deadlines, can one be assured that the Network is consistently reliable? We have experienced first-hand that university teachers use technological platforms -- all of it simply taken or bought, of course—without a single mention of this deadly pandemic, without any ostensible recognition of the scope of this horror. And they certainly do not adjust the material to fit the circumstances. They teach and assign grades in the same way as they always have or would have in normal circumstances. This lack of awareness and subsequent adjustment is all okay, one supposes. But while millions are dying and millions more are being stricken down, the habitual becomes unconscionable. The lack of awareness is callous and unforgivable. For their part, students seldom have questions about anything meaningful; questions are restricted to how many words, what grades, when are deadlines. The blindness appeared ubiquitous. Here, we all have a burden to bear: shallowness and pettiness. Meanwhile, the world writhes from the devastation wrought by this Corona 19 virus.

Teaching and learning are now almost exclusively on-line, and the world’s quantum leap in technological advancement is not only advantageous but absolutely necessary. At this point, globally, there are intense debates and discussions about how and when and under what conditions the re-opening of educational institutions can occur. There is, of course, no impactful evidence of such debates or discussions here in Guyana. World-wide, ideas are being advanced as to whether to remain with on-line teaching and learning. There are a series of hybrid options, thanks to the great people who have invented Zoom, Moodle, Canvas, Edmodo, Schoology, Sakai, Showbie, iTunesU, Google Classroom, WhatsApp, etc. The world may stay with on-line teaching and learning exclusively until some inventive country finds a vaccine. Or, we may do some form of hybrid instruction mixing on-line with limited face-to-face instruction. Or we may implement some form of flexi-time, broken into mornings and afternoons, varying between grades, staggered classes or programs or courses. Or an on-off for classes, splitting classes into parts to accommodate physical/social distancing.

In the United States of America, the Covid 19 Virus has laid bare and exacerbated the divide between those who have and those who do not. Hollywood actors and the wealthy are administered the best and quickest Covid 19 tests as frequently as they desire. The turn-around time is almost instantaneous. Owners, coaches, and athletes in the National Basketball Association (NBA); the National Football League (NFL); Major League Baseball (MLB); National Baseball League (NBL); and National Hockey League (NHL) are constantly being tested, again with immediate turn-around results, and isolated and quarantined if found positive. Nothing at all is wrong with this. However, those without fame and fortune (and even those of modest means) line up for as long as 12 hours to get tested. That is if those tests are available at all. If they are fortunate, they get results in seven to ten days. Thanks to scientists and researchers like Dr. Anthony Fauci, we know that the gestation period for this virus to become full-blown in symptomatic patients is 10-14 days. The delayed turn-around time makes the test almost useless, since the spread has already occurred and more people have gotten the virus in the interim. The spread progression, of course, is neither arithmetic nor even geometric. The progression is exponential. It is no wonder, then, that Black and Brown members of the population—the most economically disadvantaged in what we still regard as the most powerful and richest nation in the world—are the hardest hit. These facts are well known to all global citizens. One needs only turn on the television or go on-line and listen and watch and read. There is REAL analysis and

information from scholars and practitioners from every possible academic discipline. All of this is readily available and permeates to all corners of the globe through every reliable news outlet in the world.

The one implication that is seldom or never broadcast or heard is that the Covid 19 Virus has laid bare and widened the already enormous chasm that exists between nations that have and who are wallowing in poverty and debt. The gaps between developed nations, developing nations, and under-developed nations are quickly becoming unbridgeable. The global economy has already shrunk an alarming 20%. Countries in the latter two categories depend largely on lending agencies like the International Monetary Fund and the World Bank. Charitable handouts from places like China, the EU, Canada, and the USA are finite and shrinking. Under the Trump administration, the USA has already cut aid to the “darker” countries dramatically.

Against the odds, some populous developing nations have had stunningly low death rates. They include Pakistan, Sri Lanka, Vietnam, and Taiwan. Apart from the fact that these countries acted immediately and efficiently with regards to the containment and mitigation of Covid 19, they also have sturdy public health infrastructures, including medical research university hospitals. Those countries which were and still are in denial (including America and Brazil), played politics and the futile blame game are now reaping the bitter fruit of illness and death. Even the Center for Disease Control (CDC)—the most highly regarded and expertly staffed agency in the world—had to bend to political pressure. The CDC is beginning to resist those political pressures and have released a comprehensive set of guidelines, although none of this has been made mandatory in the USA.

2. The Major Foundations

While the Federal Government of America has lead the charge in denying the reality of Covid 19, *The Bill and Melinda Gates Foundation* has lead the fight globally against the virus. The Foundation has identified some of the cascading effects that will afflict the developing world, including shrinking economies; joblessness; exacerbated poverty; malnutrition leading to weakened immune systems in whole populations; and the further weakening of health systems (where they exist at all), etc.

The Foundation is working assiduously on the following, simultaneously:

1. Immunomodulators: Drugs to regulate the immune system to counteract C-19.
2. Therapeutics that will cut the death rate due to C-19
3. Anti-Viral Drugs that will attack the Virus
4. Monoclonal Antibodies: proteins engineered to interfere with the Virus.

These desperately needed and back-breaking research activities--sponsored by one among many Foundations, we must remember—are in addition to billions of dollars of grants to countries in Sub-Saharan Africa and other places. While Foundations and Nations and experts attached to universities are working assiduously day and night to find ways to save lives, there are also those front-line workers who are working to do the same: the doctors, nurses, first-responders, cleaners, postal workers, grocery clerks, and many others. They are putting themselves at grave risk to save us, and they are getting sick. They are dying.

Medical researchers, doing REAL research are now finding that even after those who have been infected and have recovered are far from being in the clear in terms of health and well-being. Even those who have recovered from Covid 19 are faced with long term and even life-long ailments, including the following:

- Depression and anxiety
- Psychosis—a condition that affects the way the brain processes information.
- Delusions
- Deleterious cognitive effects
- Chronic fatigue
- Heart and other organ problems

The American Heart Association has warned that 23% of recovered Covid 19 patients suffer cardio complications while 8% to 12% have devastating heart problems. Scientists have expressed fear that these patients will face life-long health struggles.

3. Education/Re-Opening of Schools and Other Educational Institutions

While there are continuing debates and discussions on what modes of learning and teaching ought to be used in order

that education move ahead, there is no doubt that schools and universities must re-open eventually, since face-to-face teaching cannot be fully replaced by on-line instruction. Education is not homogeneous. Children at the kindergarten level, for instance, learn differently from those in secondary schools, and the former are much less acquainted with the use of technology. Partial on-line instruction may apply to senior secondary school children and college and university students, if they have the equipment and broad-band connectivity. Educators and demographics specialists have suggested that as many as 50% of children in the developed USA have no or limited access to 4G and broadband! And what of delayed learners (or “slow learners”, as we tend to label them). What of differently-abled children?

The issue of re-opening schools cannot be looked at and solved as if it were one issue that is separate from a complex of other issues. Nations can re-open schools in willy-nilly ways for the sake of their economies at their own peril. And yet, economies versus schooling is a false equivalency. We need not choose; we need to be prepared.

As the On-Line Education Berlin (OEB) organization has insisted: we need to re-imagine education. We can begin by re-imagining the pandemic-ready classroom. If our single contribution in the fight against the Covid 19 Virus is a prototype of the re-imagined classroom, then we would have made an invaluable contribution to the global education enterprise.

Dr. Becky Pringle, President of the National Education Association of America, has recently warned: “There are still no means to ensure social distancing in the classroom...and [there is] no funding to find ways to re-open schools safely”. Dr. Tom Frieden, Former Director of the Center for Disease Control insists that the US “must adapt schools to the new Covid 19 reality”. He also warns that there should be reduced crowding in schools in order that we minimize the spread of the virus. He further stipulates that there is still no overall access to distance learning in black and brown populations in the USA.

4. Covid 19: Guyana

There is much from Dr. Pringle and Dr. Frieden that applies to Guyana and to countries like Guyana. Here, we are yet to advance any original initiative to reduce class numbers that would assure social/physical distancing. And while we ought to have learned that schools can re-open only if and when we have established conditions that are verifiably safe, we have demonstrated no ability to do so. Two hand-washing sinks per school building simply does not do it, especially if they are side by side. This would ensure a cluster, the exact thing we ought to be avoiding. We have no idea of who, where and how many have access to the essentials necessary for distance learning. While the government of America has refused to provide funding to schools, we here in Guyana have little or no funding at all—even though our new government seems willing to do all it can. The pattern of being dependent still holds. In the end, WE have to think ourselves out of this disaster.

Here in Guyana, we do not need to re-invent the wheel; a great deal of work has been done by others, elsewhere. But we do need to learn about that work and make use of it by taking off from it. We can learn a great deal from Denmark, for instance. “Think big and act fast!” was the secret to the Danish success against this Virus, says the Danish Finance Minister. And this was since April, 2020. Globally, the best scientists are finding out new facts about this Virus, and we need to be sure to keep ourselves constantly informed and up-dated about these developments and build them into our own National Anti-Pandemic Plan. We have provided the CDC Guidelines link from which we can select applicable mitigating strategies. But our Government must mandate these, although there will inevitably be the usual naysayers who did not and do not even try to have a National Plan. Doubtless, there will be empty charges of “tyranny” and “dictatorship”, but our citizens will be safe and healthy.

As our situation worsens, one sure thing is this: Guyana MUST devise a Coherent, Uniform, Integrated National Plan. The United States for all its economic and expertise wealth is in desperate straits (almost 7 million infected and more than 200,000 dead!). Inarguably, this is because the Trump administration has failed to arrive at a National Plan. Poorer countries cannot follow this woeful example.

Assuredly, we need to begin by articulating that which we have learned from others elsewhere. Here, then, is what we know:

1. We know that we need wide-spread testing. Currently, our testing rate is .8% of our population. With our tiny population of 779 thousand people, wide-spread testing could be done with some ease, despite the fact that a small percentage of us are far-flung. Overall testing (rather than cluster testing) will identify infected and symptomatic and asymptomatic citizens. We also know that some 40% of asymptomatic patients spread the virus.
2. We know that we must track and trace.

3. Having found who and where citizens are infected, we can implement structured isolation/self-isolation/quarantining measures **WITHOUT STIGMATIZATION**.
4. Mandatory mask-wearing at all times when in public or in schools.
5. Physical/social distancing at all times when in public or in schools.
6. No social gatherings of more than ten, still ensuring physical/social distancing.
7. No crowds/bars/social events unless social distancing is in force.
8. Spend as much time outdoors as possible, including during school activities.
9. Hand-washing every two hours and sanitizing all surfaces.
10. Taxis and buses should have their windows down with reduced passenger loads.

These measures have been shown to be effective in stopping the spread of the virus. It is obvious that they work very effectively in societies that are disciplined: South Korea, Japan, China, Taiwan, Denmark, Finland, Norway, etc. Because we Guyanese are certainly not known for our discipline, these measures will need to be mandated: one warning for contravention, followed by significant fines, followed by loss of licenses, for instance. All of this, of course, must be communicated clearly and constantly to citizens. They must be made aware that these measures are part of our collaborative fight against a deadly enemy. They need to know that no one is to blame for having contracted the virus, but that we must each do our part to stop the spread.

We also know (or ought to have recognized) that the Center for Disease Control (CDC) guidelines “recommend” that no community nor County nor State (or Nation) should re-open schools if the Covid Positive Rate is above 5%.

Some States in the USA with Positivity Rates above 5% have, for political expediency, re-opened schools, universities, and colleges at their peril. Cases have spiked, many people have died, and schools, universities and colleges have had to shut down again after just 2-5 days after re-opening. Guyana cannot pay that price; but we will if we do not learn and act upon that learning.

The statistics in Guyana, broken down, paint a gloomy picture, and we must remember that we are yet in the midst of this disaster and that it is yet evolving:

Table 1. Total number of COVID-19 cases and deaths recorded in Guyana (March 11, 2020 – September 30, 2020)

Month	Number of cases per month	Cumulative number of positive cases	Number of deaths per month	Total number of deaths
March	12	12	1	1
April	70	82	8	9
May	71	153	3	12
June	92	245	-	12
July	168	413	8	20
August	893	1306	19	39
September	1588	2894	41	80

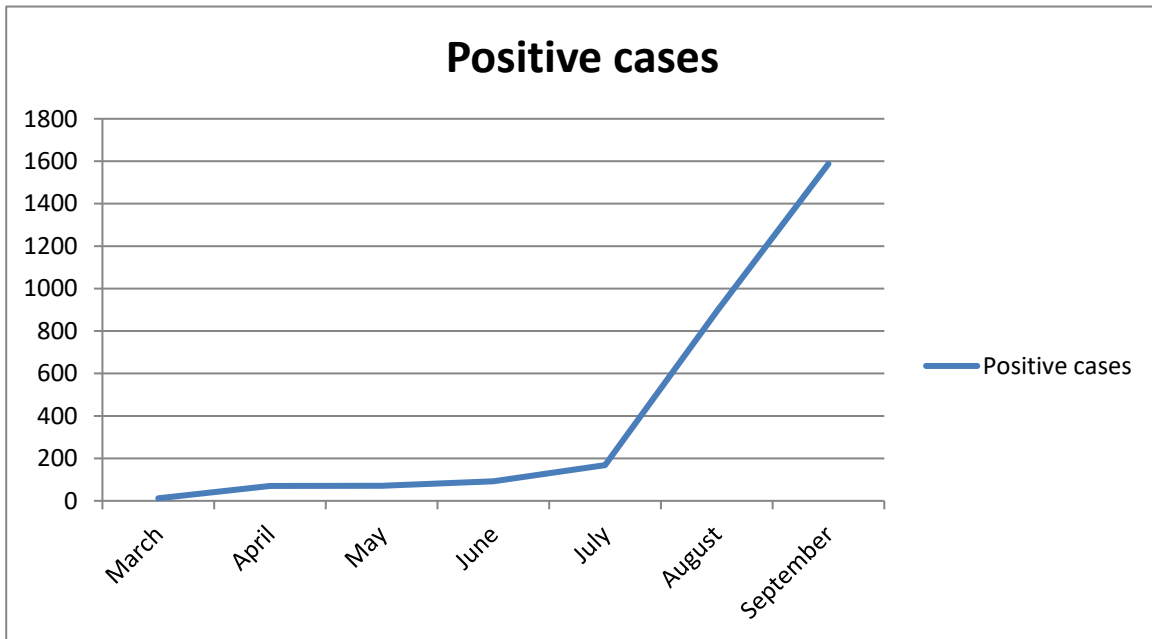


Figure 1. Number of positive COVID-19 cases represented by months in Guyana

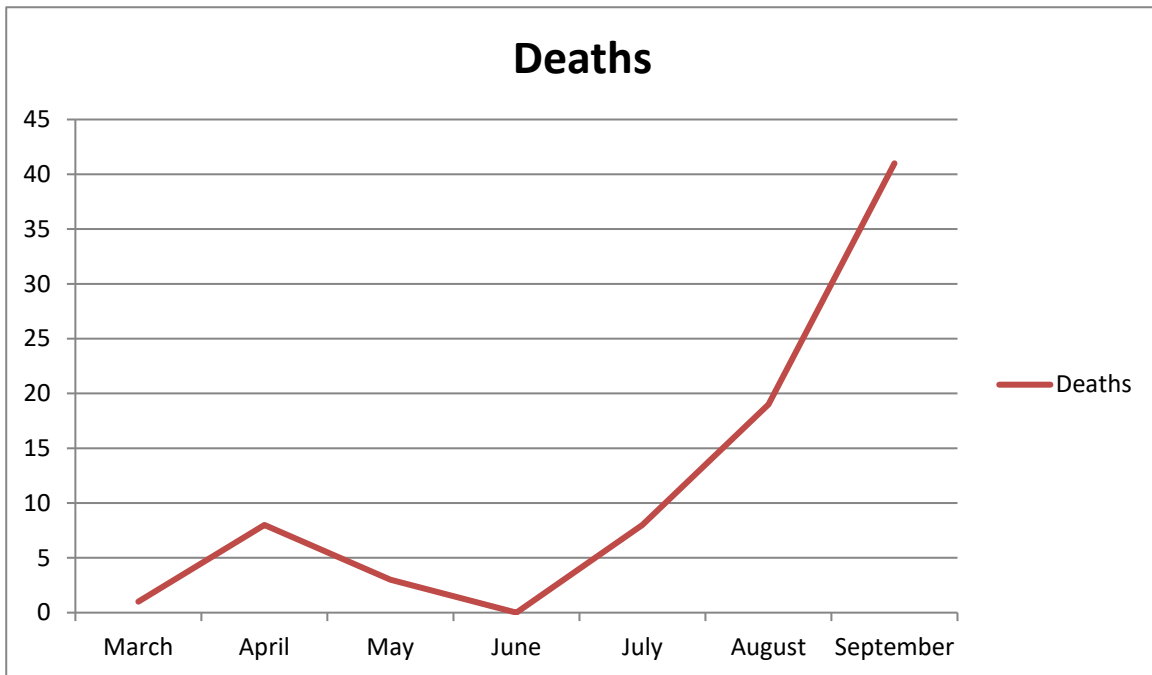


Figure 2. Number of COVID-19 deaths recorded by months in Guyana

Table 1 above shows that the cases in September far surpass the accumulated totals for March, April, May, June, July, and August. This establishes the dramatic acceleration in cases and in deaths. Since we are yet to have wide-spread testing, we also have no way thus far of knowing just how greatly we have been hit by this Virus. Of course, the numbers above seem small, especially when we read or see the numbers of cases in the USA, the hardest hit developed country in the world, with more than 7 million cases and more than 200,000 deaths...and counting. Super-spreader events (political rallies, the foolish politicization of masks and social distancing, college and

university partying, large gatherings, etc) are making the numbers worse. The USA has tested only hundreds of thousands thus far; **the number of positive cases is just shy of 6.65 % of the numbers tested.**

Table 2. A percentage comparison between USA and Guyana

United States of America		Guyana	
No. of tests done	107,536,225	No. of tests done	14,082
No. of positive cases	7,150,165	No. of positive cases	2,894
% of positive cases	6.65%	% of positive cases	20.55%

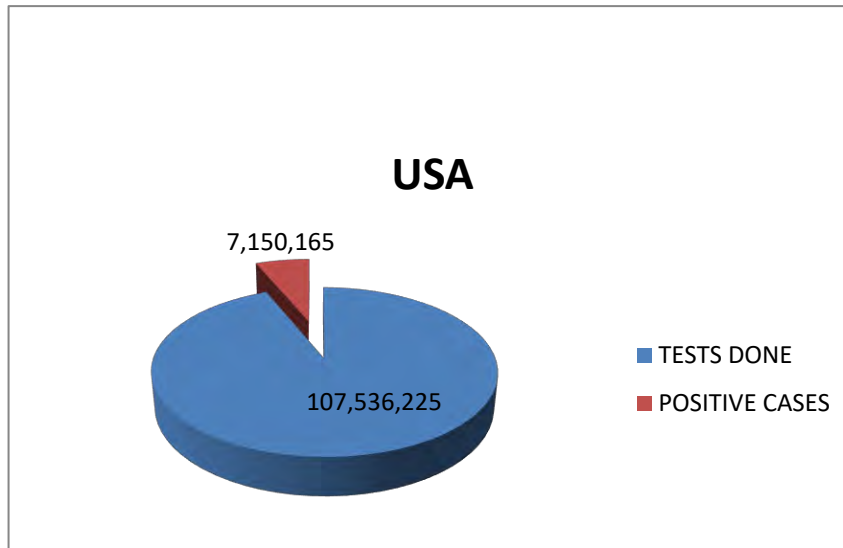


Figure 3. Pie chart comparing the numbers of tests done to the number of positive cases recorded in USA

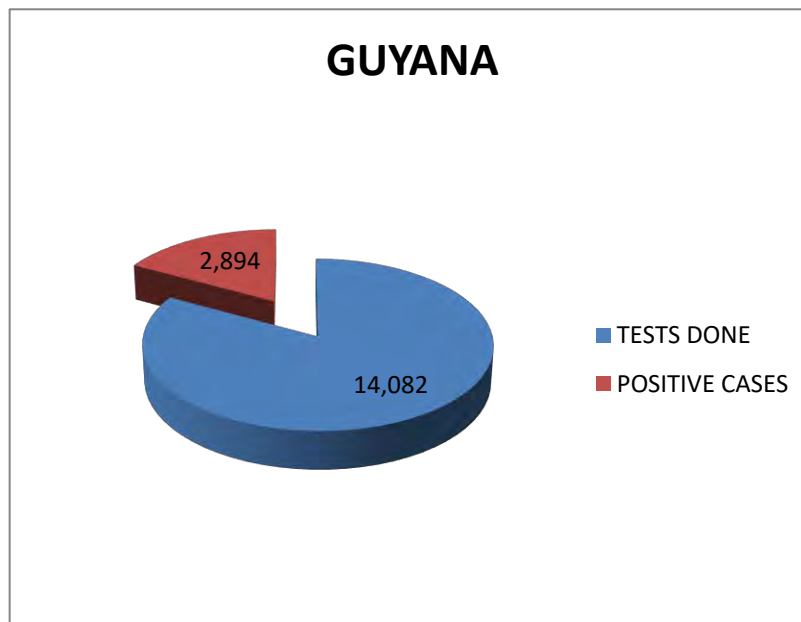


Figure 4. Pie chart comparing the numbers of tests done to the number of positive cases recorded in Guyana

In spite of the great difference in actual population numbers, Guyana’s chunk of the national pie is much larger in terms of positivity rate per tested population.

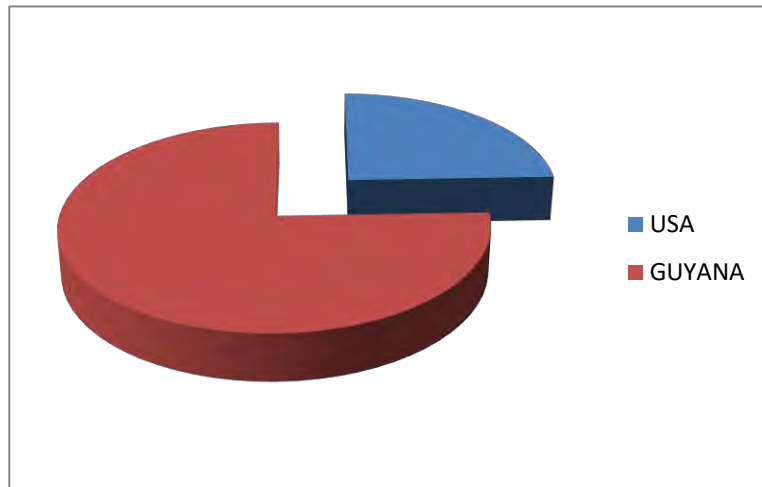


Figure 5. Comparison of the positivity rate in relation to number of tests done between USA and Guyana

In Guyana, the number of tests done is 14,082 and the number of positive cases is 2,894. The percentage of positive cases, in relation to tests done is 20.55%, triple that of the US. This is not to make an empty comparison between the richest country in the world and Guyana, a very poor country. We cannot compare numbers, but we can compare percentages. And we are in more dire straits than America. In the USA, the politically-driven re-opening of schools and colleges and universities has been disastrous. We can and must learn.

The following charts lay out the case more clearly than do mere figures:

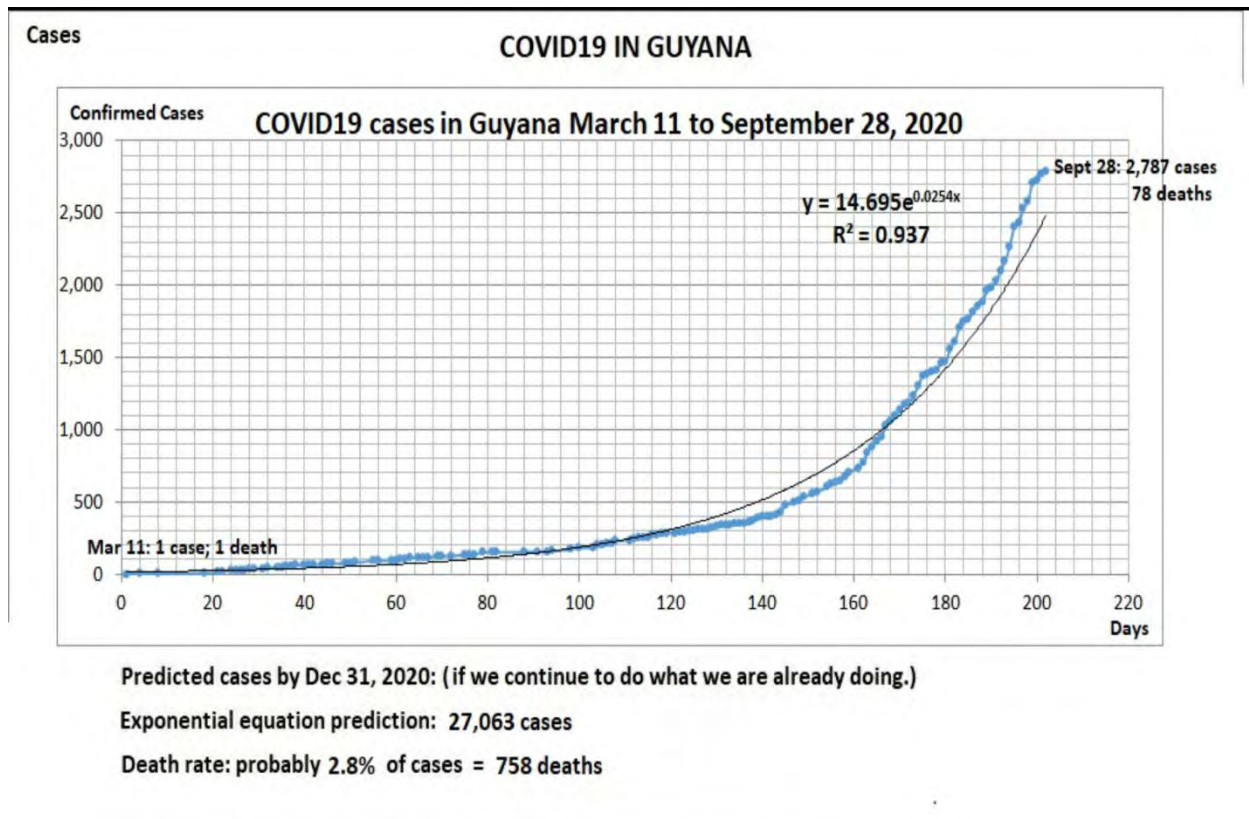


Figure 6. Number of confirmed COVID -19 cases in Guyana (March 11 – September 28)

This chart lays bare the steepness of the infection rate as of now. An analysis by Kemol King in Kaieteur News of August 26, 2020 reports that of the people tested in Guyana in August, 1 in 4 people tested positive. The cases are increasing; the situation in Guyana is worsening.

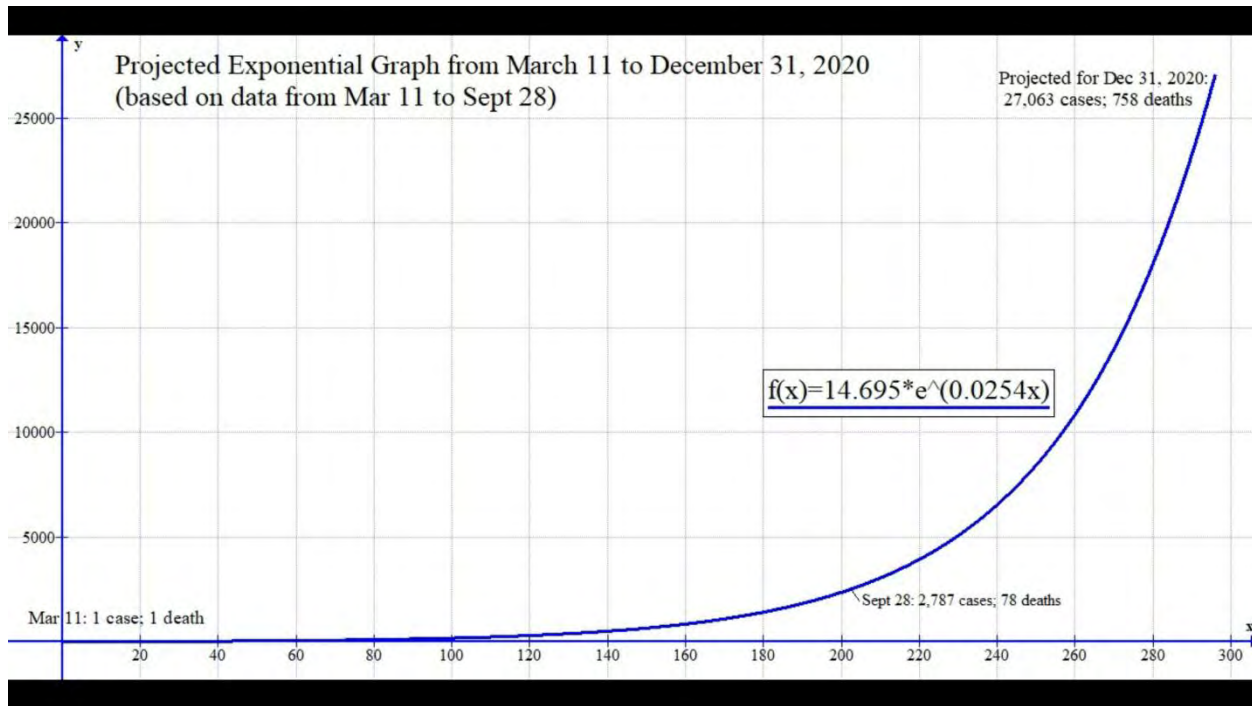


Figure 7. Projected Exponential Graph from March 11, 2020 to December 31, 2020

Even without the 1 in 4 acceleration in August, this graph demonstrates the steepness of the rise in cases by December 2020. The fundamentals outlined above (masks, social distancing, hand washing, etc.) must now be enforced without delay. We must learn from places like Denmark, South Korea, New Zealand, etc. Upon the first known cases in Denmark, there was immediate action. The country was notified about a total lockdown, and stay-at-home orders were scheduled to begin on March 16, 2020. Famous for their civic-mindedness, the citizens voluntarily stayed at home four days before the schedule. The Danes came together, and just over 50 days after the lockdown, Denmark returned to a new normal: there was no clamor, no acrimony, no willfulness, and no denial, not at any level. Together, they stopped the virus from spreading; educational institutions were adjusted to establish and maintain social distancing; education methods were slightly adjusted to place greater emphasis on fun and less on curriculum; testing and tracing continued; businesses were re-opened; public services returned to normal; and there remains much greater vigilance and awareness.

Different though the two may be, this could hardly be said of places like the USA and Guyana. The pertinent thing here is that schools were re-opened with only slight adjustments. Classrooms remained fundamentally the same, save for socially distanced desks, and there were more outdoor classes.

World-wide, in terms of the classroom structure, there is only minimal change. The traditional desks and chairs remain, even though there are reduced student numbers by half on a rotational basis. In Scandinavian Countries three-sided Plexiglas was used for social distancing in the classroom and to prevent droplets from being transferred from one child to another. Civil servants and parents voluntarily supplemented the number of teachers. In Thailand, old ballot boxes were used to provide separation. We are suggesting more dramatic changes to the classroom structure to prepare for the safe re-opening of schools and other educational institutions during Covid 19 and **all other forthcoming pandemics**. This is the classroom truly re-imagined and re-invented to be **The Teaching and Learning Station (T&LS)**.

5. The Teaching and Learning Station (T&LS)

We have re-imagined and re-designed the traditional classroom into being a **Teaching and Learning Station**. In the process, we have harkened to every epidemiological/medical data and opinion available. Our design follows all applicable guidelines from the *Center for Disease Control* and from the *National Health Institute*. We have also

harkened to the guidance offered by the *Ministry of Health* here in Guyana. Although our design does not show the obvious (mask wearing at all times when in schools; hand sanitizing every two hours; and no crowds, for instance), we have supposed that there is sufficient awareness that these must become part of our regular national habits.

We will show our concept by sectional stills and by tri-dimensional representation in order that you have a more vivid idea of the T&LS.

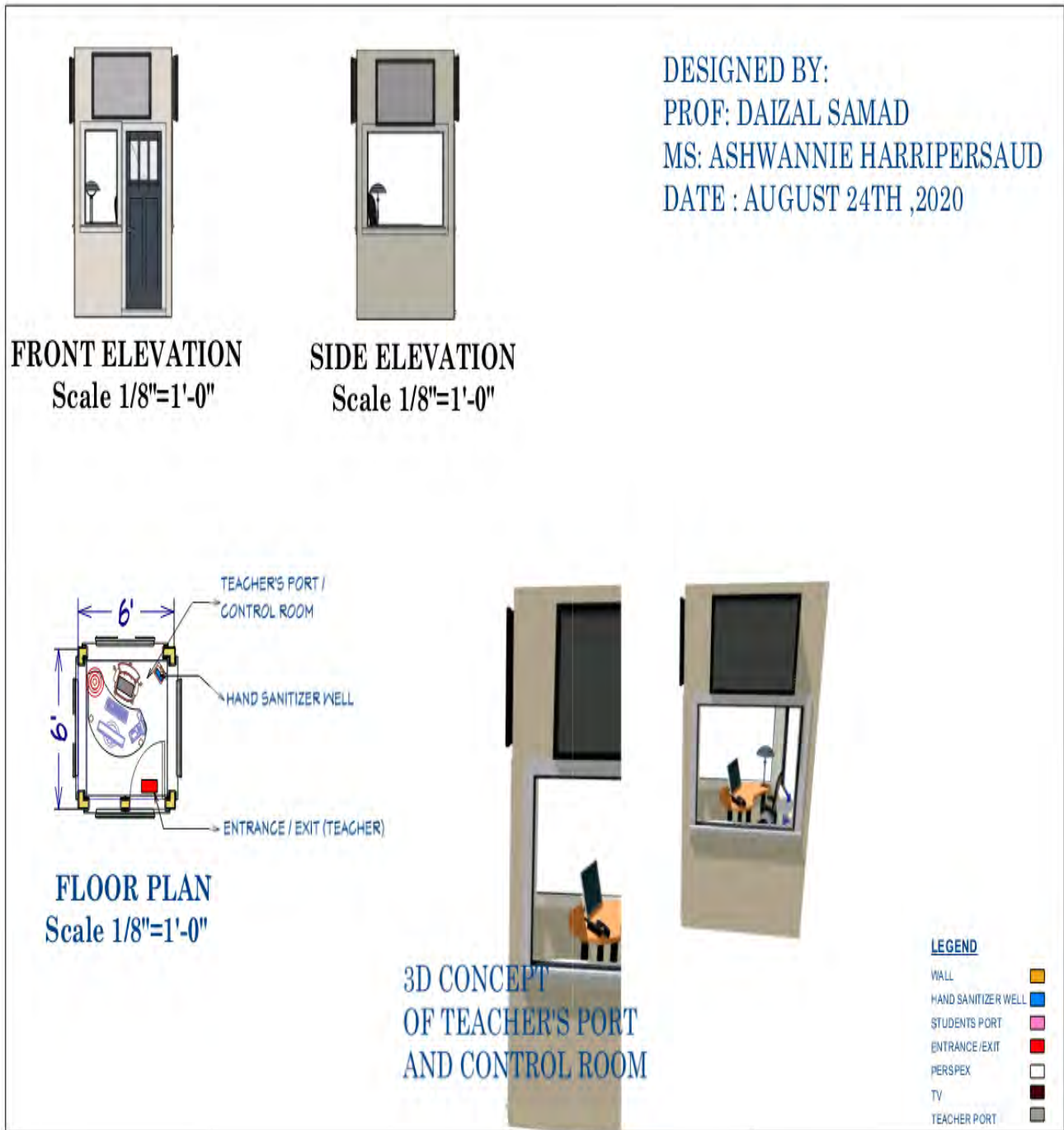


Figure 8.

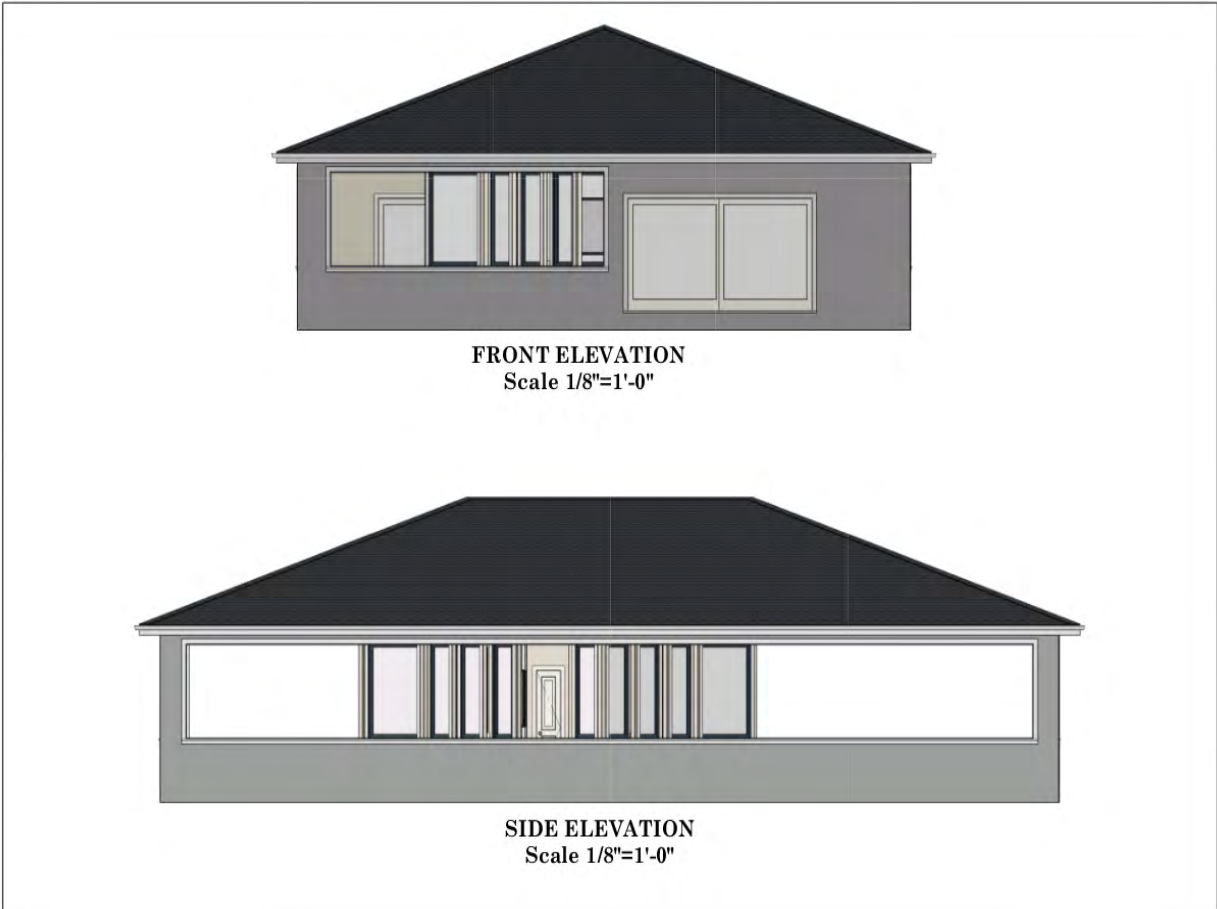


Figure 9.

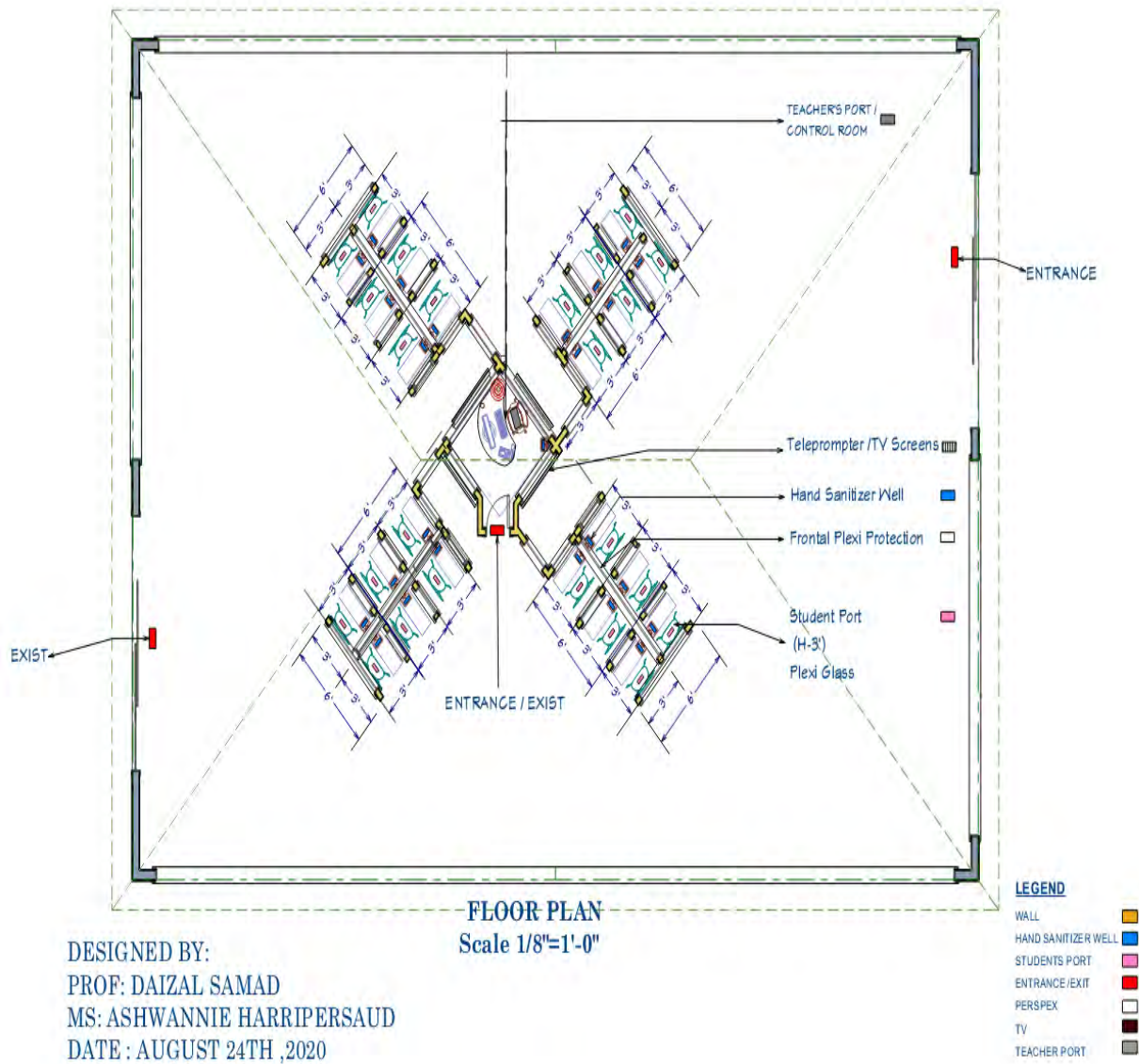


Figure 10.

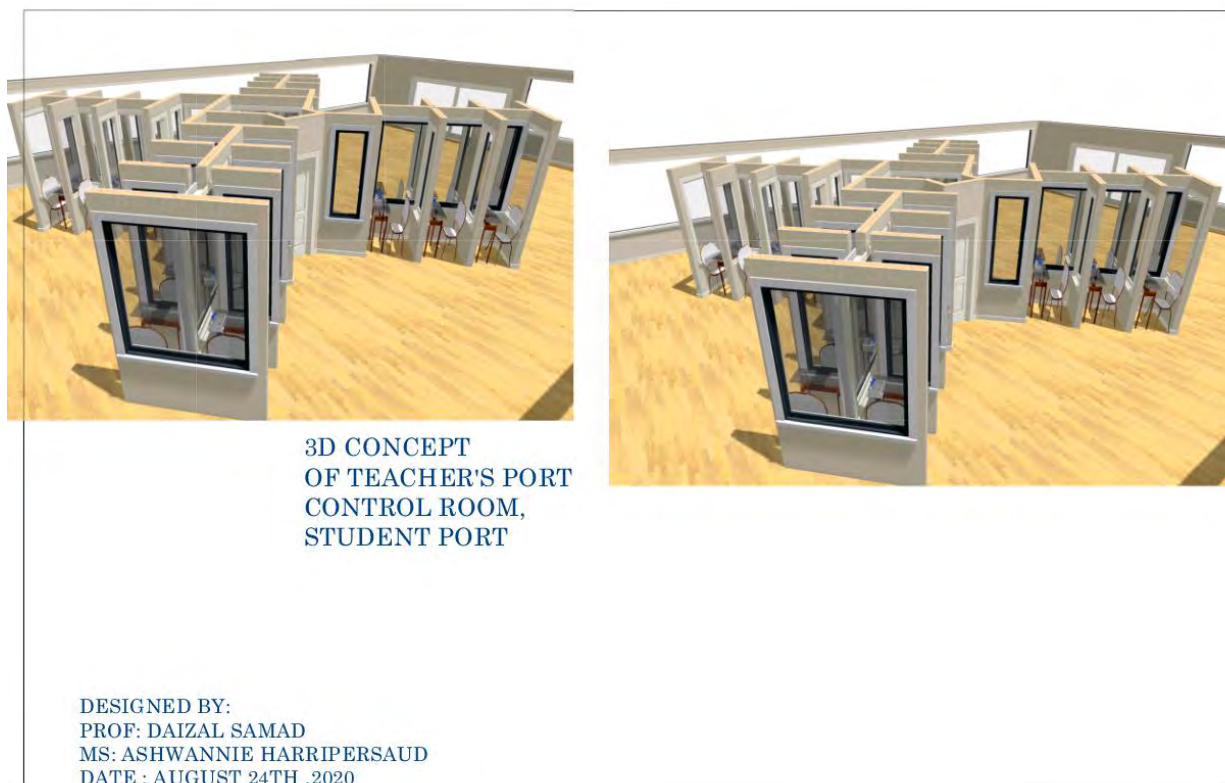


Figure 11.

The representations of the **Teaching and Learning Station** demonstrate the following vital physical and safety features:

1. The T&LS has 4 wings, each wing being 15 feet in length and 6 feet in width.
2. The length and width of the wings ensure social distancing between students and between students and teachers.
3. All surfaces are made of $\frac{3}{4}$ inch plywood, strong enough to withstand bracing, leaning, books and other material(s).
4. Each wing accommodates individual ports for 5 students, two on each side and one at the head of each wing. This would give us a total of 20 students per one-hour of face-to-face instruction.
5. The student port replaces the traditional desk/bench/chair.
6. The teacher port is centrally located and is 6 feet by 6 feet.
7. Student ports are enclosed by nickel-lined acrylic or Plexiglas, with heights that block aerosol and droplets transfer. It also mitigates any potential ricochet factor. The nickel-lined Plexiglas makes for greater stability and permanence.
8. The teacher port, also enclosed with Plexiglas on all sides, is central. This centrality assures that the teacher is in the direct and comfortable line of vision of students on all sides. The height of the Plexiglas inhibits aerosol transference, and the elevation of the teacher port assures that the height of the Plexiglas does not hinder the sound of the teacher's voice.
9. Four-sided monitors are placed around the teacher port at a height above that of the average teacher for unhindered viewing by students from all directions. This also ensures that the teacher is in clear view of the students and vice versa.

10. The monitors are controlled by a central desk-top computer bolted onto the teacher's desk situated in the teacher port. The teacher is equipped with at least 2 high capacity flash drives for pre-prepared content. These may also be submitted electronically in place of the old "lesson plan".
11. The dimensions of the re-imagined T&LS can be fit-for-purpose, and can be built within the traditional classroom space.
12. Student ports are equipped with numbered buzzers should students need to get the attention of the teacher.
13. Each student port and the teacher port are equipped with built-in hand sanitizing wells.
14. There are discrete entry and exit points for students.
15. Teachers also have a separate entry/exit route since the teacher port is enclosed and secured and may need to be unlocked. Once again, it also assures social distancing between the teacher and the students.
16. One T&LS can serve up to 20 students at any one time. With staggered classes, **Teaching and Learning Stations** can be used safely and effectively for the entire school day. However, we need to ensure that there is the sanitized wiping of all surfaces after each class.
17. The teacher port is equipped with a desk, computer and keyboard, and a comfortable swivel chair.
18. The teacher port may be equipped with an application alerting the teacher as to which student needs his/her attention for questions/comments.
19. It must be remembered that this re-imagined and re-designed T&LS is a permanent feature not only against COVID-19 but against future pandemics.

This re-imagined and re-designed **Teaching and Learning Station**, when (if?) implemented can go a far way to ensuring the **SAFE** re-opening of schools. It should be noted that our T&LS does not replace in totality on-line teaching and learning; however, it does facilitate face-to-face contact between teachers and learners in ways that are safe for students, teachers and staff, parents, and the community as a whole.

It would also be useful to note that this re-imagined and re-designed T&LS can be adapted for board rooms, conference rooms, staff rooms, university and college rooms, meeting rooms, etc.

6. Ancillary Considerations

In spite of the apparent virtues of our novel **Teaching and Learning Station**, there are ancillary areas about which thought must be given. They are as follows:

- (a) We must communicate to the community (especially teachers and students) the importance of social distancing and mask-wearing when in public or on their way to and from schools, as well as while in schools. The messaging must be clear and effective, and the penalties for not following mandatory guidelines established. Of course, where there are penalties systems, there ought to be contiguous reward systems.
- (b) Temperature-testing stations must be set up at the entry of all school compounds, ensuring that students are at least six feet apart as they line up for temperature checks.

There must be clear markings to establish distance.

- (c) We will need to increase the number of workers (cleaners, temperature takers, teacher assistants, etc.) and volunteers (parents are invaluable here).
- (d) We may need to create more entry and exit points if schools are inadequately prepared in this regard. These (including stairwells) must be marked to establish distance. Where possible, windows should be kept open to ensure air flow.
- (e) Each school must dedicate space for an adequately equipped "Covid- Ready Control Room". This will serve as a secure area for those suspected of having the infection and for emergencies. There should be an equipped nurse or nursing assistant to staff the Covid Ready Control Room.
- (f) Appropriate arrangements ought to be made for the conveyance of children in ways that assure distancing. Taxi and bus windows should be open for air passage.
- (g) Each and every current classroom does not need to be re-designed, but the number of T&LS must adequately reflect the school population.

- (h) The innovative nature of the T&LS will inevitably attract students, teachers, parents, and the community as a whole. This makes for excitement and better educational receptivity on the part of students, teachers, etc.
- (i) It should be borne in mind that the one-day-on, one-day-off (or in-person class/on-line class) does not mean “days off” for teachers and students (M/W/FRI and TUES/THURS/SAT). Teachers will be required to mark and return assignments submitted on-line.

7. Building the Prototype (The Poorer Nations Context)

With material help, we propose to build a prototype of the re-imagined and re-designed Teaching and Learning Station. For instance, the University of Guyana Berbice Campus may be the most convenient location for the prototype in Berbice. Initial locations in other countries will be determined by their local authorities.

The T&LS Prototype can be ready for show-case viewing in Guyana about one month after we get the nod from governmental authorities. We would be happy to present the prototype to decision makers and other interested parties in person.

8. Limitations

1. Given the projected upward trend, we are keenly aware that time is not on our side. With each passing day, there are more victims of COVID 19. Urgent decision making and action is necessary. Once again, we should see this as preparation for inevitable future pandemics.
2. COST- (a) The cost of each T&LS is about 1 million Guyana Dollars or 5,000 USD, including workmanship. In Region 6, we have arranged for one prototype to be built free of cost for workmanship, but we will need donations for materials.
(b) The cost of each T&LS is not prohibitive given the benefits, but the accumulated cost can be quite intimidating for poorer nations.

9. Conclusion

We have no doubt that effective vaccines will be developed by the great minds with which we have been blessed, and that the world will recover from this current COVID-19 pandemic. Of course, poorer and less attentive countries will recover at a much slower rate, especially when we realize that there will be more potent mutations/variants of COVID-19. We also have no doubts that there will be future pandemics. To be prepared is the only option to avoid even greater catastrophe. One way to be prepared would be to implement this **Teaching and Learning Station** worldwide. Our original design is versatile and may be adjusted to different sizes of classroom spaces, boardrooms, conference room, and other situational circumstances. In the final analysis, at the very least, this T&LS has the potential of minimizing the impact of the current and future pandemics on educational enterprises.

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