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Impacts of the COVID-19 Pandemic on Global Education

Santanu De

Nova Southeastern University, sde@nova.edu

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CHAPTER-6

AUTHOR'S INFORMATION



Santanu De, M.Sc., Ph.D.

Dr. De is an Assistant Professor of Anatomy and Physiology in the Department of Biological Sciences, Halmos College of Arts and Sciences at Nova Southeastern University, Fort Lauderdale, Florida, USA. He received a B.Sc. in Physiology (Honors) from Presidency College, Kolkata, India, an M.Sc. in Biophysics, Molecular Biology and Genetics from the University of Calcutta, India, and a Ph.D. in Physiology from Kent State University, Ohio, USA. He pursued Postdoctoral Fellowships at Purdue University, West Lafayette, Indiana, USA and at Yale-NUS College, Singapore (a collaboration of Yale University with the National University of Singapore). He was a Visiting Faculty in the Department of Biomedical Sciences at Grand Valley State University, Allendale, Michigan, USA. Dr. De has taught multiple courses in Anatomy, Physiology, Cell Biology, Human Biology, and General Biology. His research interests include STEM education, pedagogy, and physiology, in which has published several peer-reviewed papers. More information can be found in his professional profile: <https://www.linkedin.com/in/santanu-de-62809923>. At leisure he likes to sketch or play the keyboard synthesizer.

CHAPTER-6

IMPACTS OF THE COVID-19 PANDEMIC ON GLOBAL EDUCATION

Santanu De

*Assistant Professor of Anatomy and Physiology, Department of Biological Sciences, Halmos College of Arts and Sciences, Nova Southeastern University, 3301 College Avenue, Fort Lauderdale, Florida 33314, U.S.A.
Phone: +1-954-262-8106*

Corresponding author: **ABSTRACT**

Santanu De
E-mail:
sde@nova.edu

Coronavirus Infectious Disease 2019 (COVID-19) has been one of the most dreaded, recent pandemics impacting multifarious global sectors, including education. To control contagion, affected nations ordered academic campus closures and home-schooling plans. Schools, colleges, and universities underwent a paradigm shift adopting internet-based delivery of lectures, synchronously or asynchronously (recorded), with virtual labs. Medical education suffered significantly; suspending student internships in hospitals decreased practical exposure to clinical specialties, impairing students' performance, and competency. Teachers of traditional classes, with technical assistance, undertook rigorous trainings to restructure pedagogical and assessment strategies online using web/mobile applications and other digital tools. This could potentially compromise instructional quality, particularly of tertiary education or tactile/experiential subjects, in absence of hands-on resources and live interaction. Lack of network capacity or educational opportunities would discourage socioeconomically challenged, struggling, disabled, or remotely/rurally located students. COVID-19 led isolation impeded numerous students' attendance, learning and cognition and caused psychological stress or anxiety among students

Keywords

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and academic staff. However, such environmental risks threaten vulnerable populations, especially children, whose physical and mental health along with future development and productivity builds upon early, formative years. These long-term consequences can be avoided through institutional guidelines for effective distance education, ensuring that curricular contents set and meet expected course goals and learning objectives, without being too overwhelming. Innovative, information-based e-pedagogy can be enhanced by relevant videos or problem-oriented approaches to foster students' interest, awareness and application, not only to achieve academic success but to be disciplined and well-rounded people valuing the importance of balanced diet, exercise, sleep, personal hygiene, interpersonal relationships, and social responsibilities. A major contributor in preventing and managing infectious diseases is health literacy, supporting which can help combat pandemics. Design and implementation of policy solutions should aim at promoting health and education. These require cooperation of individuals, communities, health professionals, media, governments, as well as non-governmental organizations.

I. Introduction

Coronavirus Infectious Disease 2019 (COVID-19), also called as Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2), has been one of the most devastating issues of worldwide concern in recent times. COVID-19 was declared as a pandemic by the World Health Organization (WHO) on March 11, 2020. It had multifaceted consequences, direct or indirect, on almost all global sectors, among which a significant one was education. This chapter reviews notable published reports of the key effects of COVID-19 on multiple levels and disciplines of education observed across various countries and regions of the world.

2. Impact on K-12, STEM Education, and Higher Education

At the outbreak of the pandemic, governments of affected nations, starting with China, ordered academic campus closures and home-schooling plans to control the contagion [1]. Educational institutions needed to undergo a paradigm shift, adopting internet-based delivery of lectures through synchronous (live) and/or asynchronous (recorded) sessions, complemented by virtual labs.

Teachers of traditional classes, with technical assistance, had to undertake rigorous trainings to restructure pedagogical and assessment strategies online using web/mobile applications and other digital tools. This could potentially compromise instructional quality, particularly of tertiary education or tactile/experiential subjects, in absence of hands-on resources and live interaction. Lack of network capacity or educational opportunities would discourage socioeconomically challenged, struggling, disabled, or remotely/rurally located students [2]. COVID-19-led isolation impeded numerous students' attendance, learning and cognition, and caused psychological stress or anxiety among students and academic staff [3, 4].

In response to COVID-19, online education was introduced to a private school in Georgia with 920 students among 47 virtual classrooms using Google Hangouts [5]. In order to evaluate the efficacy of the shift to distance education, daily assessment of the online learning process was conducted. Adjustments were made to class time and lesson schedules. Class time was reduced from 35 or 45 minutes of face-to-face teaching before the pandemic to 30 minutes of online engagement during the pandemic to minimize the duration of the kids' contact with computer. Adjustments to lesson schedule allowed students a larger break between classes, with fewer lessons covered each day. Performance of lower grade students on assignments were noted to be better compared to students in higher grades. This could likely be owing to the removal of official grading during the process of online education.

In Zambia, the government ordered closure of all schools, colleges and universities indefinitely from mid-March 2020 [6]. Three teachers at a public secondary school in Chipata District of Zambia's Eastern Province were interviewed; the Natural Sciences

Department Head, the Mathematics Department Head, and a science teacher. The data indicated perceptions that performance in the G.C.E (General Certificate of Examination) would likely decline in absence of student-teacher contact. According to the findings of this study, the pass percentage of secondary school students in the year's national examinations could drop because of the untimely school-shutdowns and abrupt disturbance in the academic calendar. Teachers and/or students would hesitate teaching/learning in any environment with possibilities of COVID-19 infection; school-organized preparations would be hampered, and slow learners would struggle even more. Children's commitment to academics would be disrupted due to lack of live guidance by a teacher and greater workload of assignments to make up lessons missed. Loss of access to course materials and facilities not accessible at home, especially in STEM subjects, would put students at a disadvantage.

On the other hand, digital learning in mathematics education could have been catapulted by COVID-19; for instance, at the University of Zambia (UNZA), learning proceeded via e-learning platforms such as Astria or Moodle, while Rusangu University (RU) harnessed tools like YouTube for online instruction [7]. Students communicated with each other and with instructors through Google mobile applications such as Google drive, Dropbox and Cloud, while being educated via Moodle Cloud and Edmodo. They also used social media sites like WhatsApp, Twitter, Facebook, Instagram, and Yahoo. Based on 102 questionnaires provided to students pursuing a Bachelor of Science Mathematics Education at Copperbelt University (CBU), it was found that most students accessed technology via smart phones and least via campus computers. Student surveys of diverse teaching styles demonstrated that YouTube videos provided useful online math tutorials, live Skype casting helped with online lectures and discussion, social media platforms like Facebook assisted students to share information and collaborate to solve math problems, and emails or text messages permitted students to communicate regarding books and notes.

3. Impact on Medical and Healthcare Education

COVID-19 affected medical education significantly. Suspension of student internships in hospitals limited practical exposure to clinical specialties, impairing

performance and competency [8]. In the United Kingdom, all observership and medical students were suspended from attendance at clinical specialties, which caused degradation of their performance on exams. Furthermore, final year medical students faced challenges at taking their final assessments. Several measures have been adopted to counter the adverse effects of COVID-19 on medical education, such as online problem-based learning approaches. Formal medical teaching in hospitals was cancelled and exams were delayed in Chinese medical schools. In Canada, clinical clerkships and electives were paused for six weeks.

As a result of COVID-19, Pre-clerkship learning environment saw social distancing which decreased students' experience with learning studios, lecture halls, or small-group rooms [9]. The Pre-clerkship curricula were converted into online modes covering content in basic as well as health system and behavioral sciences. With small-group formats being transformed into virtual instruction and online exams, clinical skills often did not develop efficiently. Candidates were isolated from each other and from the instructor. Clerkship learning environment, too, was affected as the value of education diminished with surgical procedures, combined with telehealth, following cancellation of routine appointments, and frequent lack of personal protective equipment (PPE). Students were not involved in suspected or confirmed COVID-19 cases and were removed from clerkship environment. In March 2020, the Association of American Medical Colleges (AAMC) directed medical schools to halt clinical rotations for medical students, and schools were permitted to take their own decisions based on specific circumstances. Challenges in availing emergency medicine away rotations and standardized evaluation letters on account of this pandemic were addressed recently [10].

Neurosurgery residents' training and education were impacted as well [11]. Social distancing demanded cancellations of educational conferences and other large gatherings. Rotations were cancelled to avoid exposure and preserve personal protective equipment (PPE). Nonessential surgery volume was cut short. Teaching hospitals prohibited in-person didactics. To protect residents but not compromise the knowledge and experience, medical organizations recommended suspending contact between medical students and patients, requiring students managing suspected or COVID-19 cases to have

adequate supervision by faculty, postponing primary as well as oral examinations, and not punishing trainees for situations they had no control over. Online education and only emergency neurological surgeries were implemented. Likewise, a general surgery residency program in the Division of General Surgery at the University of Washington Department of Surgery was restructured on emergency during the pandemic [12].

Urology residency training had to be adapted during COVID-19 [13]. This included access to PPE and COVID-19 testing, precautions for residents, reformation of hospital protocols and COVID-19-related safety measures, and restructuring temporary residency (for e.g., rotating teams to take care of urological services). Clinical training in areas other than urology (for e.g., in emergency room or intensive care unit) was encouraged, coupled with telemedicine and virtual surgical simulation. In Italy, urologists had to incorporate management of COVID-19 patients as part of their practice, despite risk of the infection in some procedures like laparoscopy [14]. Response of radiology residencies amid COVID-19 dealt with clinical coverage and work redistribution centering around physical distancing, protection of patients and staff, pedagogical alterations, resident requirements, disaster preparedness training, etc. [15]. In the UK, simulation and technology-enhanced learning were proposed to negotiate and adapt to the challenges in healthcare education [16]. These included 360° field-of-view cameras to augment virtual settings, video case studies, etc. as well as embedded videos, links to videos on sharing sites, documents, websites, online learning courses, podcasts, webinars, and links to other online resources.

4. Impact on Dental Education

COVID-19 impacted dental education as well in the United States [17]. All 67 dental schools in the US had to submit a report to the Commission on Dental Accreditation (CODA) on curricular changes, distance learning, and alternative modes of assessment to ensure safety while maintaining continuity in the education. Various challenges encompassed transition to remote learning, social distancing in preclinical simulation lab exercises, inability to use mannequins online, lack of portability of virtual reality systems, need for programs to determine students' competency without exams, and timely graduation. Barring emergencies, clinical activities were suspended at most

dental schools. European dental academic institutions resorted to non-clinical teaching with live videos, pedagogical software, online meetings, links to other virtual tools, and social media groups.

5. Impact on Pharmacy Education

Across the US, students of pharmacy took part as frontline workers in combating COVID-19 [18], ranging from 38 fourth year pharmacy students in the Cedarville University School of Pharmacy to one student providing medications for Cleveland Clinic employees and patients, or assisting in curbside pickup at pharmacies.

6. Discussion

COVID-19 necessitated prompt and drastic transition of most face-to-face classes to online education. Innovative, information-based e-pedagogy can be enhanced by relevant videos or problem-oriented approaches to raise students' interest and application, not only to achieve academic success but to be disciplined and well-rounded people valuing the importance of balanced diet, exercise, sleep, personal hygiene, interpersonal relationships, and social/environmental responsibilities. Food safety and awareness about it is crucial [19].

Interestingly, it had recently been proposed that socially and scientifically relevant, cost-effective mobile applications with real-world applications could be leveraged as a virtual strategy to increase teenagers' interest in STEM disciplines of education [20, 21]. A creative way to stimulate engagement and learning among students of healthcare education could be designing and implementing virtual classrooms [22]. Subject-specific leadership forums, like a recent one [23], aimed at driving student engagement and achievement can enable students to learn and share ideas on media and technology use for mastering digitized course content during such pandemics in particular. These could complement novel assessment strategies postulated with established learning outcomes for research-based science laboratory courses [24-26].

Environmental risks amidst a pandemic threaten vulnerable populations, especially children, whose physical and mental health along future development and productivity builds upon early, formative years [27]. The long-term consequences can be avoided by institutional guidelines for effective with distance education, ensuring that curricular

contents set and meet expected course goals and learning objectives, without being too overwhelming.

Suggested risk management practices at universities include network teaching which can be developed for courses that are knowledge-based, tapping into the advantages of information technology [2]. Besides, curricula for practical and operational courses, or those involving research and discussion, and courses on physical education, could be appropriately modified once COVID-19 ends. A major contributor in preventing and managing infectious diseases is health literacy, supporting which can help combat pandemics [28]. Nonetheless, policy solutions need cooperation of all stakeholders – individuals, communities, health professionals, media, governments, as well as non-governmental organizations [29]. Effective implementation of the solutions must aim at promoting health and education around the world.

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