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The Effect of a Pandemic on Health Sciences Education around the World: Perspectives from Students Experiencing the Reality

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Abstract

Purpose: The COVID-19 pandemic has changed education. Technology previously used as a supplement to education has now become a requisite. We characterized how education has shifted during the pandemic to inform university leaders and educators about their learners' experiences. The learners offer suggestions for leaders to consider for better preparedness for educational disruptions.

Methodology: The authors analyzed the remote educational experiences of 78 health professional students from 20 countries between May and June, 2020. Participants completed a 19 question online survey to regarding how their school curriculum had changed, the challenges faced with these changes, how they adapted to these changes, and lessons learned.

Results: For all respondents, curriculum delivery shifted from a traditional in-person classroom model to an online module. Almost one-third of students reported complete closure of the institution. Although two-thirds reported internet access as the most significant barrier, this was also noted as the most immediate improvement universities could make.

Conclusion: The COVID-19 pandemic has changed e-learning, from an addition to a program to a necessity for delivering education. Improving access to the internet is a necessary precursor. This pandemic provides an opportunity to introduce and integrate information technology further into teaching in health professional schools.

Keywords: Improving classroom teaching; On-line learning; Post-secondary education; Teaching/learning strategies

Introduction

The COVID-19 pandemic presented a unique challenge for education broadly, and medical and health professions education specifically. Training in medicine or allied health professions require hands-on practice to acquire skills in clinical practice. In early 2020, countless medicine and health profession students had their education interrupted due to institutional plans to prevent the spread of the virus and conform to public health guidelines and governmental policies. Most universities determined their own plans of action in coordination with program accrediting bodies: some moved to online education, some fast-tracked final year students, others stopped all educational activities for the foreseeable future [1]. Researchers have initiated inquiries, but a full understanding of the barriers and facilitators to continuing health professions education during the pandemic and the impact of curriculum and delivery modality changes on learner educational experiences are unknown.

Innovative solutions utilizing technology may help to bridge the educational gap for health sciences students during this unpredictable, unprecedented time. Today, technological devices are widely available in many forms:

mobile phone, laptops, tablets, and virtual reality devices. These technologies change educational approaches and can potentially lead to their improvement. The mobile connectivity and internet access make the entire world “smaller” and allow easy communication and sharing of information, knowledge, and practices. Technology-enhanced learning (TEL, also known as e-learning) uses digital media technology such as the web, mobile phones and apps and computers, and software in teaching and learning activities across various modalities [2].

TEL in health sciences education has been a topic of interest in recent years as more resources become available at a lower cost. Several enabling factors, as well as barriers, have been investigated. TEL may enable facilitation of learning by increasing the flexibility of programs and aid in the integration of into practice (ex. virtual patients). The barriers fall into two categories: personal characteristics and resources [3]. Personal barriers include low motivation and expectations, lack of Information Technology (I.T.) skills, and poor attitude toward TEL. Resource barriers include a lack of infrastructure, high cost, and educators’ time constraints to set up online education. Additionally, not all content can be taught online due to its complicated or non-compatible nature. For example, lab work for biomedical students or practical skills of suturing or delivering bad news to a patient for medical students is not compatible with online learning [3-5]. There is not universal agreement on the barriers, thus factors vary by program and university [5]. In low-resource settings, a significant bottleneck for the implementation of e-learning is infrastructure. Most low-resource countries have limited access to electricity, the internet, and different climatic environments (high temperature, dust), which require more technical support [6]. Barriers for TEL during COVID are both personal and resource related including unreliable internet service, lack of a personal computer, heightened stress from confinement along with many homework assignments with minimal contact with instructors and peers [5-7].

The aim of this study is to explore current experiences, expectations, opportunities, and challenges in introducing and adopting distance learning through technology utilization to overcome educational delays resulting from the pandemic in health profession schools. With this research, we, identify different educational approaches taken during the early days of the pandemic in anticipation of future pandemics or other major disruptive events. This may help universities understand the facilitators and barriers to TEL for planning contingencies for events that disrupt in person education in the future, ultimately leading to improved health professional education.

Methods

We used a cross-sectional observational survey design. The survey was conducted online and included both multiple choice and open-ended questions. Questions from the survey were multiple-choice and open-ended questions.

Ethical Considerations

The University of New Mexico Human Research and Review Committee approved the study design (HRRC 20-256). Responding to the survey was voluntary. A consent form was provided in the introduction to the survey. Consent was given once they agreed to participate. No personally identifiable information was collected.

Study Population

Study participants were health professional students who are members of the Student Network Organization (SNO) of The Network: Towards Unity for Health (TUFH).⁸ We defined health professional students as enrolled in a higher-level education program to study medicine, nursing, pharmacy, midwifery, and other professions relating to health care. As of May 24, 2020, there were 438 student members from 43 different countries, 85% from low and middle-income settings. Invitations to participate in the study were posted on SNO social media platforms (Facebook, Instagram, and Twitter) and sent via email to all students in the SNO. Only registered SNO members could access the survey. Data were collected from 78 health professional students (a response rate of 18%) representing 20 countries (47% of countries in the sampling frame).

Indicators

Demographic characteristics included country where they are studying, type of degree they are pursuing, specialty course of study, the year of study they are in, and if they are pursuing a clinical health profession, whether they are in their clinical or pre-clinical stage.

The survey included four types of indicators (Table 1) to capture health professional student experiences with their curriculum during the COVID pandemic: curriculum delivery modalities, perception of the educational changes, barriers to accessing education after the changes, and participation in COVID-19 related activities.

Indicators	Questions Asked	Description
Curriculum change	<p>Q1: What type of learning was part of your curriculum prior to the pandemic?</p> <p>Q2: Since the COVID pandemic what type of learning is now part of your curriculum?</p> <p>Q3: What changes has your school made in regards to your curriculum?</p> <p>Q4: Did your university and/or national board institution adapt examinations to fit the adapted education. If yes, how? Q5: What platform is your school using for online education delivery (if any)? With a secondary question of What online platforms would you recommend for other students?</p>	<p>The curriculum was assessed by two multiple-choice questions on education delivery, one before the pandemic and one during the pandemic. We asked respondents to choose as many answers as eight educational delivery methods both pre and since COVID: In-person lectures, in-person team based/group learning, laboratory sessions, simulations, online modules, online lectures, in-person clinicals/patient interaction, telehealth clinicals/patient interaction. A 9th option of "other" allowed respondents to describe the delivery method. To get a broader perspective on the curriculum changes, one questions (Q3, Q4) addressed the curriculum's overall changes since the beginning of the pandemic and another question on changes in examination procedures. For Q3, choices include: Education is indefinitely cancelled, students cannot participate in direct patient care, classes have been moved online, students have been asked to participate in non-direct patient care (telehealth, patient hotlines, etc), students are being graduated early to help with the COVID crisis, none. Q4 options included: exams are continuing as planned (no changes to format or dates), exams will be held after the lockdown is over, exams have been indefinitely cancelled, exams take place online, national board exams were postponed, national board exams have been completely waived. Q5 choices were: No online education, Skype, Zoom, Google Hangout, Microsoft Teams, Blackboard. Participants had the option of writing a free-form text to answer if the options listed did not fit their situation.</p>
Barriers to education	<p>Q6: What have been some of the barriers to learning you have experienced during the COVID pandemic?</p>	<p>Educational barriers were evaluated with one multiple choice question with barriers: limited internet accessibility, limited access to an internet device (phone, tablet, laptop, or PC), limited IT knowledge, lack of infrastructure at university, extra costs, not being able to work with and learn from patients, limited opportunity to improve skill set (suturing, lab work, etc), limited access to residents or faculty, limited interactions with classmates. There was an option to write in free form text as an "other" response.</p>
COVID-19 activities	<p>Q7: Have you taken up any additional (outside of University) educational activities?</p> <p>Q8: What COVID related activities are you a part of?</p>	<p>To characterize the variety of COVID-19 related activities students were involved with as part of the health professional pandemic response, we asked respondents to select from a non-patient care list (online courses, research project(s), online lectures/webinars) and community response activities (COVID hotlines, COVID related research, Supporting frontline healthcare professionals [babysitting, grocery shopping, etc], working with local blood banks, working with local nursing homes, community support [food distribution, grocery pick up for elders, etc], helping produce local protective materials [sanitizers, face masks, etc]). There was a write-in option for "other" responses.</p>
Perceptions of education	<p>Q9: How would you rate the quality of the new form education?*</p> <p>Q10: How satisfied are you with how your institution has responded to this pandemic in terms of educational activities? ** Q11: Are you motivated to engage in your education during this pandemic? ***</p>	<p>Health professional students' perceptions of their education were evaluated by three questions on a 5-point Likert scale.</p>
Other Questions	<p>Q12: What do you think need to be improved at your University to better its response to the pandemic?</p> <p>Q13: What other comments would you like to share about your educational experience?</p>	<p>Finally, we asked respondents two open-ended questions. The first question asked what improvements need to be made at their university to improve their response to the pandemic. The second question asked for comments on their educational experiences not captured in the pre-formed questions.</p>
<p>*Likert Scales: 1 = Very poor, 2 = Below average, 3= Average, 4 = Above average, 5 = Excellent ** 1 = Not at all, 2 = Slightly, 3 = Moderately, 4 = Very, 5 = Extremely *** 1 = Not at all motivated to 5 = Very motivated</p>		

Table 1: Indicators of Health Professional Student Experiences.

The survey was sent by email three times between May 24, 2020, and June 22, 2020, to all registered SNO students on the TUFH.org platform on May 24, 2020. The survey was also announced once on SNO's social media platforms (Facebook, Instagram, Twitter). Only registered SNO members could access the survey. We collected survey data through the Google Surveys platform.⁹

Data Analysis

Data were collected by one researcher (VD) collected data and removed any potentially identifying information. For open-ended questions, we used a qualitative analytic approach. We grouped open-ended responses into the most common answer choices and themes using a consensus approach (V.D., WA). Researchers independently identified the themes and then compared them to create unified themes, which would allow for a thematic analysis of the responses. Responses were categorized by regions as defined by the Network TUFH to maintain consistency with responses from The Network TUFH SNO members. Countries were categorized as high, middle, or low income based on the World Bank definition [10]. Students self-selected their stage of education. For clarification, we defined medical undergraduate education as medical school for United States respondents and combine Baccalaureate and medical education for other schools. Frequencies are reported to give context to findings.

Results

There were 80 completed surveys (18% response rate, N, 438). We excluded two surveys, one based on the respondent not being a health sciences student (engineering), and the second due to not listing the country of education. A total of 78 surveys were analyzed. Responses generally reflected the broader SNO population, with deviations noted in the African, Eastern Mediterranean, and North American regions. (Figure 1) Responses total 15% (N, 12) from high income countries, 60% (N, 47) from middle-income countries, and 25% (N, 25) from low-income countries.

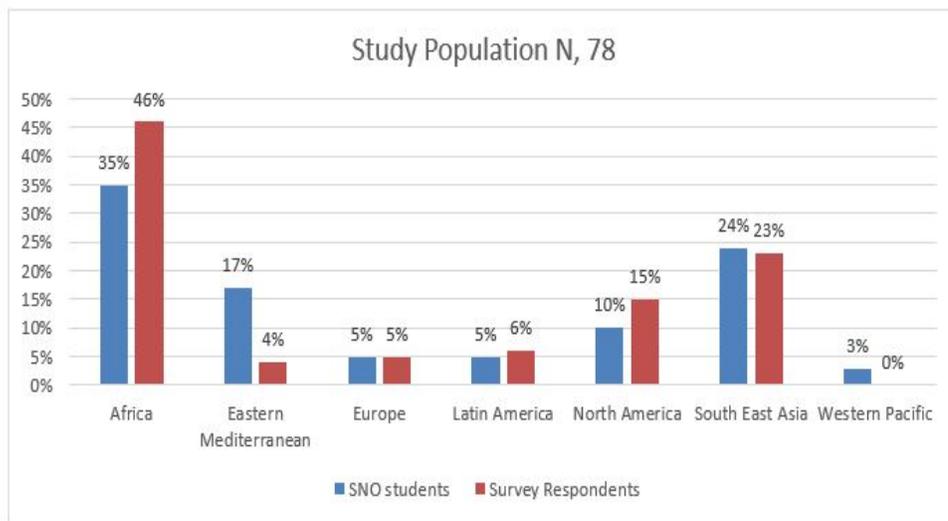


Figure 1: The Network towards Unity for Health Student Network Organization member locations and response rates within regions.

General Characteristics

Slightly more than two-thirds of respondents (77%) were in their undergraduate stage of education. The predominant field of study was medicine (65%), followed by other health professionals (14%), public or global health studies (11%), and nursing education (10%). Slightly more than one-half of respondents (52%) were in their clinical stage of training. Less than one-third were in their pre-clinical (24%) or not in a clinical training field (22%) (Table 2).

	Overall
Degree type currently pursuing (N, 78)	
Bachelor / Undergraduate	77% (N, 61)
Master / Graduate	23% (N, 18)
Field of Study (N, 79 as one respondent selected two options)	
Medicine	65% (N, 51)
Other health professionals (Pharmacy, Speech-language pathology, dentistry, physiotherapy)	14 % (N, 11)
Public/Global Health	11% (N, 9)
Nursing	10% (N, 8)
Stage of education (N, 77 as one person did not respond)	
Clinical	52% (N, 41)
Pre-clinical	24% (N, 19)
N.A./ Non-clinical	22% (N, 17)

Table 2: General Characteristics of Survey Respondents.

Indicator 1: Curriiculum Change: Curriculum delivery changed after COVID-19, decreasing in-person interactions (Figure 2) and increasing use of online modules. Almost one-third (31%) of students’ reported their schools completely closed until further notice. Specific curriculum changes also included less than 10% students participating in direct patient care (.09%), with 15% asked by superiors to participate in non-direct patient care. We asked respondents to remark on the effect of COVID on scheduled exams, which are indicators of progress. While there were no changes for 12% of students, 15% had exams canceled indefinitely or postponed (53%), and 41% moved to online exams.

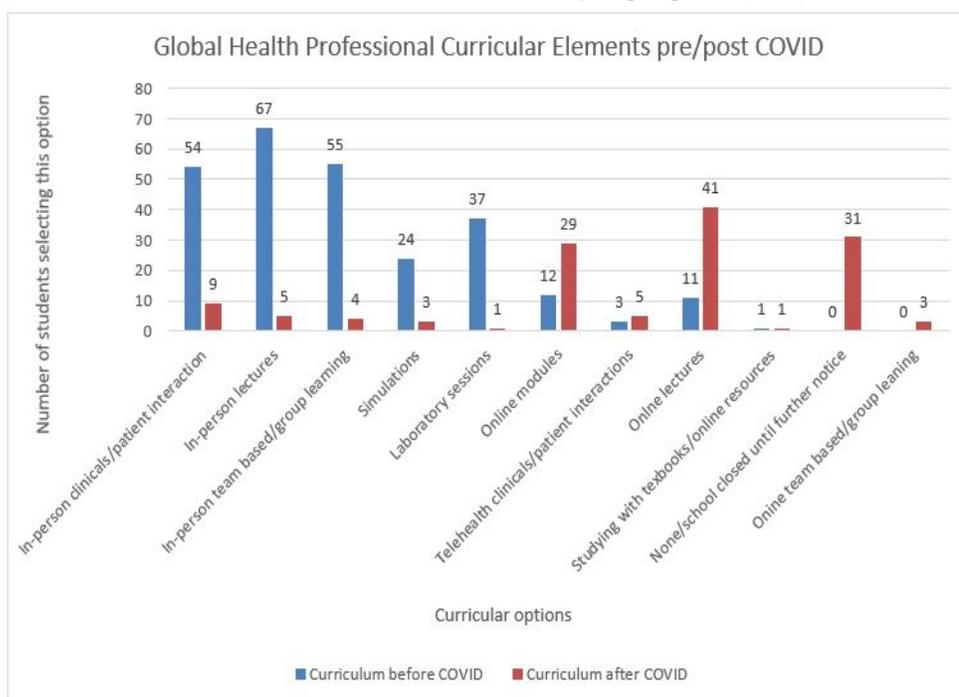


Figure 2: Changes in Education.

Indicator 2: Barriers to Education: The number of students who reported not having any educational activities is relevant. Despite an abundance of motivation in most students, resources prove a significant barrier to continuing education. Consistently identified barriers that were similar across all settings included limited access barriers (to internet or electronic devices and increased costs for learning) and the social impediment of limited interactions with others, including residents, classmates, and other group settings. On occasion, the subsequent discouragement with the inability of institutions to provide access to teachers and (online) classes is apparent, “I’ve not had any educational activity from my University since February. It’s been really difficult and demotivating” (Medical student, Nigeria). Another crucial layer to consider is the psychological toll the pandemic is taking on students. The need for personal protective equipment, better communication, and the need to restart (online) educational activities voiced by several students give insight into the unmet needs students face. A nursing student from Belgium calls for “more mental support,” asking to be more personal when communicating, “Making us feel they’re there for us.” Our findings show a disparity between students wanting to study during quarantine but impeded by low access to educational resources, leading to eventual discouragement and hopelessness about the continuation of studies.”

Indicator 3: COVID19 Activities: Despite these barriers, 68% of students remained motivated to engage in education, and many students seek out outside online courses or webinars. Students reported that they found ways to keep up with their education through online courses, workshops, or research projects. More than half (63%) enrolled in online courses outside of their university, 37% engaged in research projects, and 67% of students watched online seminars or workshops. A medical student from Uganda comments, “I have used this time to revise and take online courses for professional development.” Student responses indicate their willingness, even excitement, to keep learning “So far, I have been engaged in online programs, research, webinars, etc.” (Public health student, Nigeria).

Lastly, 65% of students participated in a variety of COVID related activities, including COVID hotlines (15%), COVID-related research (29%), supporting frontline workers (.05%), working with local nursing homes (.05%), community support (20%), helping produce PPE (13%), or engaging in public health education/campaigns (.06%).

Indicator 4: Perceptions of Education: Students reported feeling abandoned by their schools, left out of the conversation, and demotivated by the university’s response to the pandemic. The general unpreparedness of universities for virtual education has caused frustration in students.

Many students reported the new delivery modality for their education was not of high quality, with less than one-fourth (23%) rating their education above average or excellent. Further, more than one-half (56%) were not at all or only slightly satisfied with their institution’s educational response to COVID. The students who have been continuing their education online say it is different and not as complete as a “normal” curriculum. This discrepancy between educational activities, even within the same degree types in the same country, such as the above-quoted account from a Nigerian medical student who is not having any classes since February, juxtaposes this Nigerian medical students experience, “It’s been a great experience learning in my university here in Nigeria, and must say, I’m really enjoying every bit of it. Our lecturers are wonderful, [...] making sure students are comfortable at all times.”

Indicator 5: Students perspectives and approaches to changes in education: We gathered student suggestions for improvement in the implementation, or lack, of education at the beginning of the pandemic. These suggestions come from a diverse group of health professional students, who represent what students are facing. Based on the responses, we created eight recommendations that universities could consider when planning education delivery during- and post-pandemic (Table 3).

Continue theoretical education online to the greatest extent possible. Focus on interactive teaching with students doing the teaching, such as in learner-centered education. When clinical practice cannot occur, there are still some opportunities to bring clinical thinking and skills during online lessons, such as learning to differentiate heart murmurs or breath sounds.
Provide internet access. This should be done by improving infrastructure on a national level, which we recognize universities cannot directly influence. However, the universities can support students in payment for internet access directly or by organizing discount offers with local providers, especially when activities are continuing online. Many students are known not to have adequate access to the internet.
Be lenient with grading, deadlines, and attendance. Students, same as everyone, have been facing many difficulties in their personal lives. Keeping everyone to the same standard as before the pandemic ignores the struggles of the current situation.
Ensure access to teachers, mental health professionals, and other essential university resources.
Be clear in communication with the student body. Transparency in decision making and unambiguous communication are necessary for continued trust in the institutions. Students are an (if not the most) important stakeholder in education delivery and should be represented during discussions on the potential solutions.
Adapt curriculum and technology to suit online education after the pandemic. We do not know what the future will bring, but online education is a clear trend. Institutions should take time to think about how they can take this experience into the future, what type of education is most adaptable to the uncertainty of in-person lectures, and how to approach internet access and technology barriers.
COVID-19 awareness and preventative measures have to be implemented to ensure the safety of students.
Improve preparedness for future emergencies. Many institutions did not have any “Back-Up” plans, emergency toolkits, or other resources for such a drastic change in education delivery.

Table 3: Student recommendations for educational planning during a crisis.

Discussion

Different countries worldwide have produced various responses during the pandemic to continue the education process. Although there have been recent articles on the COVID-19 pandemic effect on health professional education, they are site or specialty specific [5,11-14]. To our knowledge, there are no studies on how the COVID-19 pandemic and the transition to e-learning have affected health professional education on a global basis. Our findings confirm that health science education worldwide drastically changed during the early stages of the COVID-19 pandemic. We observed a variety of changes made due to COVID-19 in both clinical and nonclinical education, with most health science education shifting to online teaching and over one-third of students reporting complete closure of their university until further notice.

Our findings are consistent with prior research on the move to online learning in the health professions fields. One of the barriers resulting from this abrupt transition to online learning was the limited ability to learn from others in person. However, the predominant barrier was limited access to the internet, without which students cannot participate in their education. Prior research has also found that limited internet coverage and technological barriers, such as limited bandwidth, are frequently reported impediments for many students in e-learning [5,15]. These findings included disruption of internet service (weakness or absence), lack of personal computers, stress due to the confinement/quarantine, lack of time, high number of homework assignments, and lack of communication with teachers are significant hindrances to their online learning [7]. Lack of in-person contact with classmates, friends, and teachers may negatively affect physical and mental health as the psychological impact of quarantine is wide-ranging, substantial, and can be long-lasting [16].

The generation surveyed is often viewed as technologically savvy, yet online education was a factor that students struggled with the most. There are many dimensions to this problem. The universities need to have resources to set up online learning. The internet connection has to be strong enough in student's homes, and the students have to have access to technology that will actively participate in education. The relationship between university resources, national internet infrastructure, and the students' resources creates many gaps that cannot be fixed with a "silver bullet." There is a clear need for improved preparedness planning in health sciences institutions, which should be working in tandem with national and local infrastructure improvement. Online education is the only way to continue with education during the quarantine. Without these changes, more countries may see a decrease in their health workforce as students may leave their chosen field or be unable to complete their education.

This brings into question the future capacity of the health workforce in countries struggling with a lack of healthcare workers [17,18]. The health care practitioners who graduated in 2019 had a vastly different education experience from those who graduated or were supposed to graduate in 2020. The adapted (often shortened) curricula, missing clinical practice, or being delayed for months may contribute to the increasing gap in the health workforce in many developing countries.

Study Strengths and Limitations

This is a descriptive article and is one of the first to inquire about the changes to interprofessional health professional education during the COVID-19 pandemic on a global scale. While our study provides valuable information on health science education during the beginning stages of the pandemic, there are several limitations. First, our sample size was small (n=78), with a response rate of 18.2%. Second, this study used a convenience sample and not systematically drawn. In addition, health profession education is organized differently in various places in the world and the experiences of students in North America, for example, are not directly comparable in areas of the world that organize their schools differently. Thirdly, this is a descriptive article finally, this study's results do not necessarily represent all the students in the health sciences globally. Due to the lack of previously verified survey instruments on education changes due to COVID-19, none of our questions were previously verified. Thus, it is possible that respondents' interpretations varied, especially across regional dialects.

Conclusion

This study collected students' perceptions of education's quality and modality in the early months of the COVID-19 pandemic. While it is not surprising that students have faced many drastic changes in the delivery of education, it is encouraging that students' motivation remains high, with students reaching out to find other ways to continue their professional development. The COVID-19 pandemic has changed the way we view e-learning, from an addition to a program to a necessity for delivering education. The importance of using technology for current students who can only learn through online and digital resources is paramount. This pandemic provides an opportunity to introduce and integrate information technology further into teaching in health professional schools.

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All authors listed are qualified for authorship, and all who are qualified to be authors are listed as authors on the byline.

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Declaration of Interest

The authors report no conflict of interest

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