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## PRE-CLINICAL MEDICAL ONLINE EDUCATION DURING THE COVID-19 PANDEMIC – CASE STUDY ON PERSPECTIVES WITHIN THE UNIVERSITY OF MEDICINE AND PHARMACY OF CRAIOVA

Oana BADEA

University of Medicine and Pharmacy of Craiova, [o\\_voiculescu@yahoo.com](mailto:o_voiculescu@yahoo.com)

0000-0001-7064-9196

### Abstract

World widely, all nations were affected by Covid-19. Preventive measures were implemented, including closure of academic schools and governments. This was a unique and unpredicted measure that took everyone by surprise, both students and teachers in higher education. In order to limit the transmission of the SARS-COV-2 virus, most countries established severe measurements even from the beginning, these including the closure of schools and universities. The aim of this study was to assess the students' perspectives and experiences on the shift to online preclinical medical education during these unprecedented times, their opinion on the effectiveness of this type of teaching and learning process, and the emotional and psychological impact that this new educational experience may have had upon them. The present study was the first one conducted during the pandemic of COVID-19 within the University of Medicine and Pharmacy of Craiova in order to explore the students' perception on the changes implied by the process of online medical teaching and learning.

*Keywords: online, higher education, Covid-19, pandemic*

### Introduction

COVID-19 is a highly infectious disease caused by severe acute respiratory syndrome coronavirus 2 (SARS-COV-2), originating in Wuhan, city of China, mostly spreading among individuals during close contact, now resulting in millions of deaths. COVID-19 is considered the greatest global health crisis since centuries in human civilization. Its severity and rapid spread led to a fast reference of COVID-19 pandemic all over the world. The pandemic of COVID-19 stroke the entire world at the beginning of 2020. Health systems were overloaded, economy was shattered and education underwent a process of unprecedented shifting to the exclusive online teaching. As a result, in Romania, higher education in general, medical education in particular, has shifted to online courses exclusively, starting from the spring of 2020. This was a unique and unpredicted measure that took everyone by surprise, both students and teachers in higher education. In order to limit the transmission of the SARS-COV-2 virus, most countries established severe measurements even from the beginning, these including the closure of schools and universities. In this way, the "stay-at-home" concept appeared in many areas of working. Students and teachers in higher education were no exception from this rule. In order to protect their vulnerable students and teachers, the University of Medicine and Pharmacy of Craiova (UMF Craiova) closed its doors to classical education starting from April 2020. This measure was taken in order to ensure a safe and healthy learning environment for the university students, teachers, and faculty staff. The foreign students flew back to their home countries, as the borders closed one by one in less than a month from the beginning of the COVID-19 pandemic.

The online or remote learning process implies that the students and teachers are physically distant from each other, their interaction being mediated exclusively by technology. The latter, if used effectively can lead to a real mutual engagement and collaboration (Bower, 2019). As such, in order for the transition to be a successful one, the user's intention and technology should be correlated and streamline. This was the time for seriously rethinking, revamping and redesigning the medical education process in our university in terms of informal and non-formal education. It is a natural assumption to state that no online pedagogical approach can replace the main position of formal education, as far as the direct teacher-taught educational process is concerned. Still, in the context of COVID-19 unexpected crisis there should be admitted that online education became a necessary pedagogical shift from a traditional method to the modern approach of Zoom or Webex, from personal to virtual

or from seminars to webinars. In the past, e-learning was considered a non-formal education, but in the present situation it shifted to the formal educational process, forced by the pandemic circumstances. Lederman (2020) stated that, as a result of the COVID-19 crisis, both teachers and students had to resort to the digital academic experience as the summum bonum of the online teaching-learning process. As a consequence, like in any situation of innovative changes, external and internal, a three-step process comes around: unfreezing-changing-refreezing. Unfreezing of traditional teaching-learning occurred during unexpected circumstances of COVID-19, thus leading to the shift into online teaching; hence, the online teaching and learning process became a necessity requiring both an organization and the individual in the unfreeze stage. As such, change became a dynamic process rather than an event, as a break in continuity. Bridges (1991) pointed out that for any result-oriented change we need to have a time suited outlook and a new mindset. This also applies to the online teaching process, both at an individual and organizational level, in order to overcome the transition phase. Subsequently, the refreezing stage becomes inevitable for integrating technology inside the teaching-learning process within our university, thus enabling us to teach our students with methods that feel both comfortable to them and also match the demands of technology in the 21<sup>st</sup> Century.

In Europe, formal medical education dates back to the late Middle Ages. Medical education in Romania dates back to 1869, when the first medical university was founded in Bucharest, the capital of the country. The Romanian medical education developed with the help of great doctor figures like: Carol Davila, Iacob Felix, founder of Hygiene School, Alexandru Marcovici, founder of medical Romanian clinic, Nicolae Turnescu and Constantin Dumitrescu-Severeanu, founders of surgical Romanian clinic, Zaharia Petrescu, founder of medical therapy, or Alexandru Sutzu, who founded the basis of psychiatry in Romania.

In 1970, the Faculty of Medicine was founded as part of the University of Craiova. The genesis of medical education in Craiova was the solution for the complex issues related to the health system in the South-West of the country, an answer to the organizational and demographical corresponding needs of specific structures of medical higher education in Romania. A short statement of historical data is necessary to highlight the importance of this achievement. On April 23<sup>rd</sup> 1947, Decree no. 801/21 April and Law no. 138 were published in the Official Monitor No. 93, which envisaged the establishment of the Faculties of Human Medicine and Veterinary Medicine in Craiova. A persistent campaign was further carried on multiple levels for the establishment of the Faculty of Medicine. On August 27<sup>th</sup> 1965, the University of Craiova was founded, comprising nine faculties, but without the Faculty of Medicine. Many prestigious intellectuals across the country, and especially those in Craiova, academic staff and medical personnel belonging to all generations joined their efforts for the common goal: the approval of the establishment of the Faculty of Medicine of Craiova. The inauguration of the Faculty of Medicine of Craiova took place on October 1<sup>st</sup> 1970, alongside the beginning of the new academic year. The faculty opened its doors to the 101 students enrolled in the first year of study. In 1990 the Dentistry specialization was founded, followed by the Pharmacy specialization in 1996. In 1998 there was founded the University of Medicine and Pharmacy of Craiova, by detachment from the University of Craiova (as established under Law no. 119/05.06.1998 issued by the Romanian Parliament).

The first case of COVID-19 in Romania was reported on February 26<sup>th</sup> 2020. On March 16<sup>th</sup>, the President of Romania declared a state of emergency and, subsequently, all schools and universities were closed, the educational process continuing online. As such, the University of Medicine and Pharmacy of Craiova complied with the national demands and moved the face-to-face courses and laboratories in the online. There was created a platform strictly used within our university, to which only the teaching staff and students had access to, through unique user names and passwords generated by the IT department. On this platform, there were uploaded all the studying material for the medical students to reach, in all the faculties within the University of Medicine and Pharmacy of Craiova. Laboratories and practical courses were held using Zoom for real-time video conferencing and webinars. The examinations were also taken online, on the same platform of the university, either as multiple choice real-time tests or as conference, thus enabling the direct online interaction between the examining teacher and the examined student. In the following academic year, namely 2020-2021, the medical higher education in UMF Craiova continued strictly online, especially as far as the preclinical education was concerned. Meanwhile, the university resorted to the use of a new video conference platform, namely Cisco Webex.

In this context, the academic teaching staff and the students within the University of Medicine and Pharmacy of Craiova had to self-teach, with the support of the online tutorials provided by the university, in order to use these platforms effectively. In spite of all this unexpected situation, the educational and administrative activities in UMF Craiova continued, albeit the national health crisis, which was changing on a day-by-day basis. The preclinical medical education, including subjects like Anatomy, Physiology, Biochemistry, Biophysics, etc., had to change their face-to-face lectures and laboratories by shifting to an exclusively online teaching and learning process. Given the fact that the 2<sup>nd</sup> Semester started at the end of February 2020, the bulk of preclinical lectures

and laboratories had already been delivered to the students when the mandatory legislation of university closure took place. The departments within the preclinical medical education in UMF Craiova did their best to continue the delivery of the teaching process as smoothly as possible, considering the pandemic and its effects.

## Aim of the study

However, such an overnight change in the educational process and lifestyle of the students due to COVID-19 may have affected the preclinical medical students' learning, teaching outcomes, possibly their way of studying, and, why not, their mental health state. The aim of this study was to evaluate the students' perspectives and experiences on the shift to online preclinical medical education during these unprecedented times, assess their opinion on the effectiveness of this type of teaching and learning process, and the emotional and psychological impact that this new educational experience may have had upon them.

## Materials and methods

The present study included a number of approximately 300 students in the 1<sup>st</sup> and 2<sup>nd</sup> year of study within the University of Medicine and Pharmacy of Craiova. They received an anonymous questionnaire via e-mail from Google Forms. The questionnaire was created especially for this study, comprising questions regarding the age, sex, opinion on the online preclinical medical education, online examination, problems related to the use of Webex platform, problems related to the teacher-students interaction during the online lectures and laboratories, any possible psychological effects due to the online teaching and learning process or the quality of the educational online process and the level of preparation of the teaching staff in UMF Craiova. In addition, at the end of the questionnaire, the students had the liberty to give their own suggestions for a future improved online educational medical process. All the answers were sent back to the study coordinator, anonymously. A statistically descriptive analysis of the data collected was performed, by establishing proportions (%) out of the total respondents, according to the criteria included in the questions of the questionnaire, namely "sex", "age groups", "academic year (first or second year)", "place of residence during COVID-19", "quality of online teaching and examination process", "emotional discomfort due to online medical education". In addition, the authors provided a qualitative analysis of the students' suggestions given in the last section of the questionnaire, in terms of a better use of the online teaching tools in order to improve a future educational process run exclusively online within our university.

## Results

The average response of 57.5% (n=145) resulted from the students' completed questionnaires (first year 67.6% and second year 32.4%) from both preclinical years. The majority of the respondents were between the ages of 18-20 years old (54.3%); also, most of them reported that they lived with their family during the pandemic period (82.1%). It is important to mention that, since Craiova is a relatively large city in Romania, students customarily live with their family during their academic years. Regarding the sex of the respondents, 67.6% of them were females, while 32.4% were male students. The respondent students data are presented in Table 1.

**Table 1**

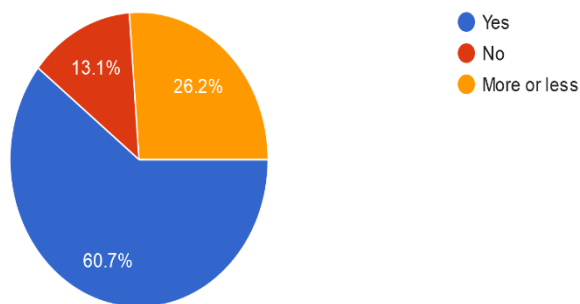
<b>Year of study</b>	1 <sup>st</sup> Year 67.6%	2 <sup>nd</sup> Year 32.4%
<b>Age groups</b>	18-20 years old 54.3%	20-22 years old 45.7%
<b>Sex</b>	Males 32.4%	Females 67.6%
<b>Residence during COVID-19</b>	With family 82.1%	Alone 17.9%

### *Perspectives on the online teaching*

As far as **the degree of satisfaction of students experienced while studying medical preclinical subjects online**, the majority (60.7%) claimed that "the online teaching was a satisfactory process" for them as students, 26.2% considered this process "more or less" satisfactory, while only 13.1% of the respondent students considered online teaching an unsatisfactory process overall (Figure 1).

Figure 1. Perspectives on the degree of satisfaction the students experienced during the study of medical preclinical subjects

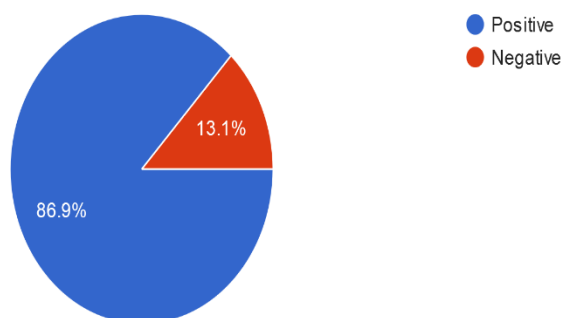
The on-line teaching process was a satisfactory process for me as a student:  
145 responses



In addition, regarding the process of **the online examination**, most of them (86.9%) admitted that it was a positive experience, while only 13.1% viewed this experience as a negative one (Figure 2).

Figure 2. Perspectives on the online examination process.

The on-line examination process was a positive or a negative one?  
145 responses

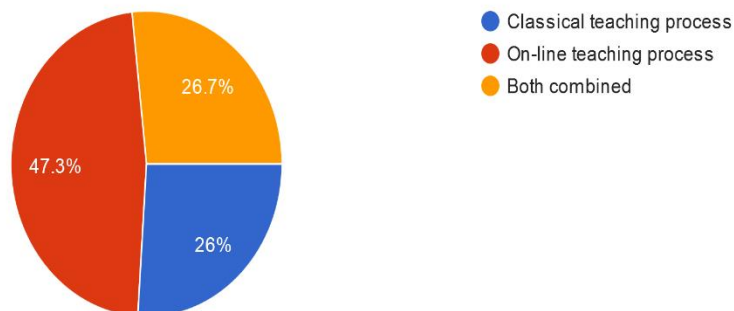


One of the most surprising results of this study was represented by the answers of students related to the question on **their future choice of the teaching process**. As such, 47.3% stated that they would prefer the online teaching process, despite the classical teaching process, which received only 26% percent of their answers. The combination of the two processes (classical and online) was the choice of 26.7% (Figure 3).

Figure 3. Perspectives on the students future choice of the teaching process.

In the future, I would prefer:

146 responses

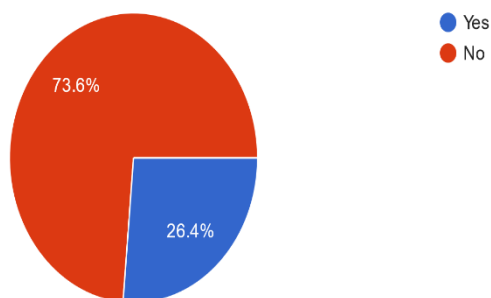


The platform used for the online teaching process within the University of Medicine and Pharmacy of Craiova was Cisco Webex. Every teacher and every student received a personal user ID for using this platform. Regarding the experiences on the use of this platform by the respondent students in this study, 73.6% did not encounter any major problems during the online teaching process, while 26.4% underwent some technical or internet connectivity issues (Figure 4).

Figure 4. Perspectives on the problems encountered while using the Webex platform.

Did you have problems using the Webex platform?

148 responses

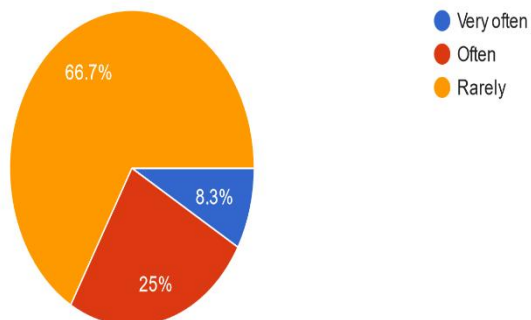


As such, when asked about the frequency of the technical problems encountered during the online educational process, most of them (66.7%) rarely found themselves in a complicated situation, a quarter (25%) experienced problems often, while a relatively small percentage (8.3%) said that they faced technical problems during the use of the Webex platform very often (Figure 5).

Figure 5. Frequency of problems encountered while using the Webex platform.

If yes, how often?

72 responses

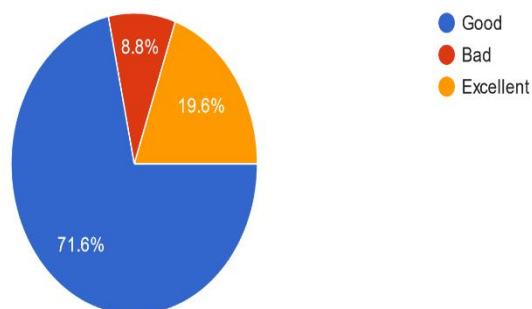


Also related to **the quality of the sound and image** during the use of the Cisco Webex online platform, the majority of the respondents (71.6%) claimed that the parameters were good, a small minority (8.8%) considered them bad, while the rest of 19.6% experienced an excellent image and sound quality (Figure 6).

Figure 6. Perspectives on the quality of sound and image.

The image/ sound quality during the on-line teaching was:

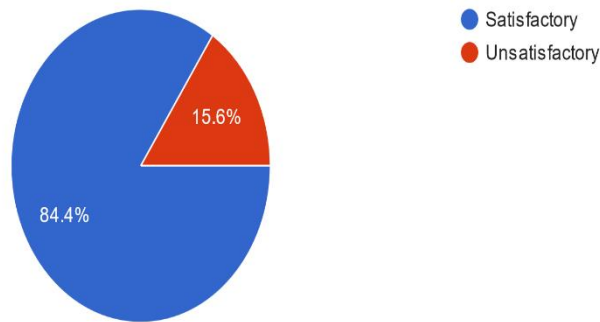
148 responses



**The teacher-student interaction** was another parameter under research within the present study. In this light, the results showed that the vast majority of 84.4% of the students responding to the questionnaire considered that the interaction between the preclinical education teachers and the students of the University of Medicine and Pharmacy of Craiova was a satisfactory one. The rest of 15.6% viewed this process as an unsatisfactory one (Figure 7).

Figure 7. Perspectives on the student-teacher interaction.

The teacher-student interaction was for you:  
147 responses



In addition, most of the respondent students felt that **the medical/ scientific information was correctly transmitted during the online teaching process** (82.4%), unlike the other 17.6% of the students who did not receive a correctly transmitted medical/ scientific information (Figure 8). In the same register, when asked whether **the pre-clinical subjects taught during the online teaching period** managed to raise to high standards, approximately a third (32.9%) thought they did not, while the other two-thirds (67.1%) considered they did raise to high standards (Figure 9).

Figure 8. Perspectives on the correct transmission of information during the online teaching process

Do you consider the medical/ scientific information was correctly transmitted during the on-line teaching process?  
148 responses

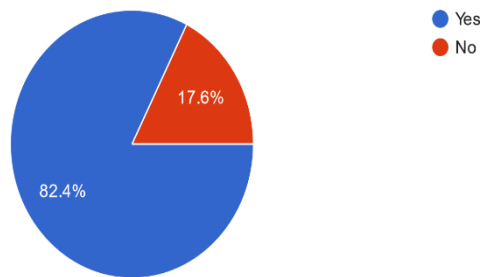
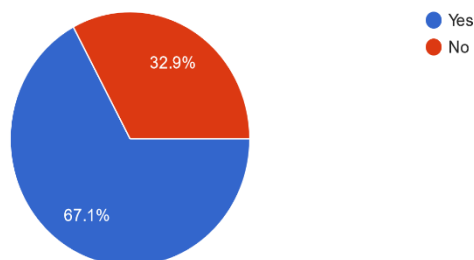


Figure 9. Perspectives on the standards reached by the online taught pre-clinical subjects.

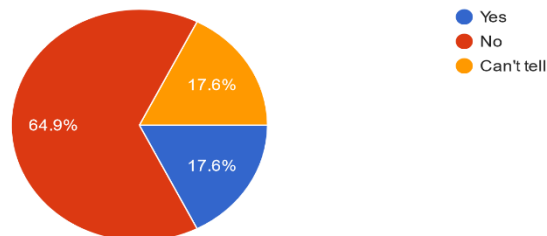
The pre-clinical subjects taught during the on-line teaching period managed to raise to high standards:  
140 responses



The questionnaire used in this study also assessed whether the respondent students underwent any emotional or psychological discomfort during the online teaching process within the University of Medicine and Pharmacy of Craiova. As such, the majority of them claimed that they did not feel any emotional distress, while the others were divided (equally) between experiencing psychological discomfort (17.6%) and could not tell (17.6%) (Figure 10).

Figure 10. Perspectives on the emotional or psychological discomfort caused by the online teaching process.

The on-line teaching and learning process caused you any emotional or psychological discomfort?  
148 responses



Instead of the last question of the questionnaire, we introduced a section asking the students to give their suggestions for improving the future process of the online medical teaching process within the University of Medicine and Pharmacy of Craiova. Overall, the most common suggestion was that “lectures should be held online, while medical laboratories and practical courses should be taught in the classical way”, namely face-to-face. In addition, several students suggested that the “lectures should be recorded and uploaded for students’ self-study process”. Another practical suggestion made was that “lectures should not be that long” (some said that there were “100 slide-long lectures”), alongside with “more clarifications when it comes to new/more complex subjects”.

As a positive feedback, we received answers saying that teachers “made good use of a lot of pictures and videos, which eased our understanding & learning process”. Also, regarding the process of online medical teaching, the respondents acknowledged that “it is very modern and flexible and protected in this era of COVID” or “it is a perfect way for teaching, beneficial for all the sides and I hope to continue teaching by this way as much as you can...”.

## Discussion

The present study was the first one conducted during the pandemic of COVID-19 in order to explore the students’ perception to the changes implied by the process of online medical teaching and learning within the University of Medicine and Pharmacy of Craiova. Similarly to the rest of the world, our university shifted all preclinical medical teaching, from face-to-face to a virtual mode (Franchi, 2020). Even though online education is not a new concept for medical sciences, for the University of Medicine and Pharmacy of Craiova, in particular, it represented a milestone and a novel experience for most of the teachers and medical students. This shifting proved to be a real challenge, both for the academic staff and the students within our university, alongside with the unknown fear of future premonitions regarding the Covid-19 pandemic. Some authors (Pather et al., 2020) considered that the greatest challenge was to learn how to use efficiently the already face-to-face prepared materials in an appropriate way as to be delivered remotely, in an online teaching and learning process. Others state that the preparation of the online materials can take up to three times more than the usual preparation time for traditional material (Gewin, 2020).

Every student may have had a personal Covid-19 experience, still, the pandemic brought about an uncertainty that certainly contributed to the anxiety and overwhelming feeling undergone by students, in general, and medical students, in particular (Ayitney et al., 2020). As such, Covid-19 has had an important impact on the global psychological wellbeing and mental health, with some individuals being affected more than others (Balkhi et al., 2020). With a better understanding of the possible medical problems brought about by this pandemic, medical students are more prone to experiencing a higher anxiety level than other university students. Even so, this study revealed that most of the respondent preclinical medical students within our university did not experience any emotional or psychological discomfort, as presented above in the Results section. This fact may be due to the fact that both the university and the students made real efforts to accommodate to the new way of



teaching and learning, namely the online process, despite the unprecedented times brought about by Covid-19 pandemic. The departments of the preclinical medical education within the University of Medicine and Pharmacy of Craiova made their utmost to continue providing the medical students with a structured and supportive environment during this pandemic, in order to minimize the possible effects of the preclinical medical subjects learning. All these changes came along in a previously well-known setting where the medical student is eager to start the clinical years, the first two years being faced with a dilemma of an unknown future with potential lack of real-life patient interaction and clinical experience (Wang et al., 2020).

The changes occurring in the medical education process should be recorded and studied, as these data will be of utmost importance on how to proceed during a still on-going pandemic and post-Covid-19, as well (Ferrel and Ryan, 2020). Therefore, the teaching materials that were prepared during this period can still be used for future academic years. Despite of the fact that resources need to be reassessed periodically, this might be a great opportunity for revising the curriculum, taking into consideration the students' comments and suggestions. In addition, there also rises the question whether this way of assessment on a virtual platform should be instituted for future examination periods, as the facility of automatically mark examinations can ease up the academic workload. Overall, the pandemic provided a real opportunity for a reflection on the teaching, learning and assessment processes provided to the preclinical students, their potential implications involved and possible changes that will be required in the future. The medical students should take advantage of the drastic changes that this pandemic brought by, as in developing collaborative skills, self-teaching, alongside with a form of resilience. At the same time, this is an ideal time for preclinical medical students to look for innovative ways on how to exhibit teamwork skills, as well as life skills.

## Conclusions

The entire population was affected by the Covid-19 pandemic world widely, from the very young to the elderly. Within this context, the medical students made no exception from this rule. After the closure of universities across Romania, in general, and of the University of Medicine and Pharmacy of Craiova, in particular, the majority of students showed concern regarding their future academic education. As such, preclinical medical students underwent a shifting from face-to-face learning to remote lectures and laboratories. The examination period during summer was held online, as well, on the platform created by the University of Medicine and Pharmacy of Craiova. Taking into consideration the assessment of the students presented in this paper regarding the online process of teaching within our university, we think that this may be an appropriate time for the reevaluation of the medical education curriculum, in that there should be taken into consideration a future online approach for most of the preclinical medical subjects, as part of a more complex process of academic medical teaching and learning. The present medical students represent the future health leaders of tomorrow and this pandemic might have had an impact not only on their education, but also on their future careers.

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