



The Impact of Strengthening Study Habits for Medical Students During COVID-19 Academic Transition: a Mixed-Methods Study

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Abstract

Purpose Assess the impact of learner-specific interventions on third-year medical students to cope with quarantine distance learning due to the COVID-19 pandemic.

Methods We conducted a nested cross-sectional and mixed-methods study in a sample of 81 third-year medical students. Two face-to-face interventions were designed and conducted to offer tools to improve study habits, time management, and prioritizing skills. A nine-item structured questionnaire was administered. Descriptive statistics was performed for the quantitative section and thematic analysis for the qualitative section.

Results Of the study population, 74.1% (60/81) completed the online questionnaire, 65.4% were female, and the mean age of the sample was 21.4 ± 1.2 years old. Overall, ~50% of participants affirmed that the workshops were useful to improve time management, organize tasks and adapt to the new study modality imposed by the COVID-19 pandemic. More than 60% of the students found the application of the provided tools during the interventions (SMART and COMPASS) useful to determine personal values and set a proper mindset for coping with distance learning. Further, 93.3% of the respondents applied the SMART strategy learned to set goals at least once during the confinement time. These findings were also seen in the thematic analysis.

Conclusions Overall, most of the students found the workshops useful and were able to practice what they had learned during this pandemic lockdown. Medical schools and higher education institutions should evaluate the possibility of formally including study habit preparation for undergraduates' students in order to provide resilience and successful academic adaptation during an ever-changing world.

Keywords Academic resilience · COVID-19 · Medical education · Proficient study skills · Study habits

Introduction

The COVID-19 pandemic has affected all levels of medical education from in-person didactics to clinical clerkship activities [1]. Major health care and accrediting bodies like the World

Health Organization (WHO), Centers for Disease Control and Prevention (CDC), and the Association of American Medical Colleges (AAMC) have recommended the suspension of any direct patient care interaction by medical students in order to minimize COVID-19 spread and avoid the unnecessary use of personal protective equipment (PPE) [1, 2]. Thus, several medical schools across the globe have transitioned from in-person training activities to online delivery formats [3]. This new learning environment has brought unique challenges for medical students to successfully satisfy demanding curriculums and keep up with high scores on summative/standardized exams [2]. Literature has reported that medical students have developed symptoms of anxiety in the immediate aftermath of the COVID-19 lockdown [2, 4]. Perhaps this anxiety is due to the lack of study skills to manage time effectively, organize tasks, and succeed at completing academic responsibilities [1, 2, 4]. Therefore, proficient study skills (PSSs) such as time management, values

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identification, and objective planning can impact students' academic success [5]. Literature globally has shown relationships between study strategies and academic performance for both medical and non-medical undergraduate students [6–8]. Even though PSSs were relevant before the pandemic, now more than ever, students should have these skills to adapt to the new academic conditions and still comply with curriculum requirements. Interventions performed by higher education institutions to aid students in developing time-management strategies, goal identification, and motivation can affect their academic performance as described elsewhere [7, 9, 10]. Yet, unlike the situation we are currently facing, these interventions were evaluated in a non-pandemic scenario. The School of Medicine at Universidad San Francisco de Quito (USFQ) funded a longitudinal study to assess the impact of a program intervention (five face-to-face workshops) designed to strengthen PSSs in a medical student cohort that started in the last semester of 2019. The interventions were developed based on the scores on the Learning and Study Strategies Inventory (LASSI) assessment, which is an educational instrument employed internationally to evaluate study skills. The LASSI test is widely used to assess students' awareness about learning and study strategies [11, 12]. Two workshops were conducted before USFQ School of Medicine transitioned to distance learning due to the COVID-19 pandemic. Therefore, we leveraged upon the assembled longitudinal study and sought to assess if these initial interventions had any impact on medical student participants to cope with distance learning. In order to do that, we performed a nested cross-sectional and mixed-methods study to appropriately reflect the experience of the study participants.

Methods

Setting

Universidad San Francisco de Quito (USFQ) is a private liberal arts university located in Quito, Ecuador. The School of Medicine at USFQ has a 6-year integrated educational program—the first 2 years focusing on basic sciences and a liberal arts education, 1 year as a preclinical transition, 2 years dedicated to clinical science training, and the last year dedicated to an internship [13]. Currently, USFQ School of Medicine has 501 students and admits 100 students each new academic year. Its primary learning methodologies are based on Problem-Based Learning, Team-Based Learning, flipped classroom, and other interactive lecture-style formats.

Model and Interventions

At the end of the first semester (August to December) of the academic year 2019–2020, USFQ School of Medicine started a longitudinal study named “A pre-post study on the

effectiveness of the Learning and Study Strategies Inventory (LASSI) score-based intervention program and academic performance on computer-based testing (NBME CBSE) at the USFQ School of Medicine, 2019–2020,” abbreviated from now as USFQ LASSI research project. This study received an exemption status coded as 2019-113IN on September 2, 2019 at the USFQ IRB office. We invited third-year medical students ($n=107$) at USFQ to participate because the NBME Comprehensive Basic Science Examination (CBSE) is used as a progress test from the third year of the program. In addition, this cohort was chosen since, at the USFQ School of Medicine, the medical curriculum for the third year is equivalent to second-year US medical students. Further, the USFQ LASSI research project planned to use the NBME CBSE and LASSI scores to assess the outcome variables after the interventions. Eighty-one students agreed to participate and completed a pre-intervention LASSI test. We designed a structured program of five face-to-face workshop interventions using Kolb's Experiential Learning Cycle theoretical framework [14], based on aggregated data results of the pre-intervention LASSI test to tackle the lowest scores among the 10 scales of the LASSI test. Figure 1 shows the results of the pre-intervention LASSI test of the 81 participants. The lowest scores were in the following scales: (i) application of time management principles for academic situation (TMT); (ii) study aide, use of supports and resources (STA); (iii) attitude, interest in academic success (ATT); (iv) concentration, ability to direct attention on academic tasks (CON); (v) selecting main ideas, identifying important information (SMI); and (vi) anxiety, worry about school and academic performance (ANX). The national lockdown due to COVID-19 happened just a week after the second planned intervention, and the students have had to adjust to a completely online delivery format since then. Due to this unusual crisis, the USFQ LASSI research project has had to stop activities until the local health authorities modify the lockdown measures.

Overall, the two face-to-face interventions had a duration of one and a half hour each. The pedagogical structure of the workshops included: icebreaker, introduction and connection to previous intervention, content delivery, active participation, closing remarks, and delivery of follow-up materials. This design allowed students to connect, participate, and apply new concepts and skills. A specific description of each intervention is presented below:

Intervention 1 A workshop session called “Tips for your academic success” was delivered after the students completed the LASSI assessment and a sociodemographic questionnaire. The speakers for this session were two full-time professors at USFQ, from the Education and Psychology departments. This session was guided via a “True or Myth” activity. Students discussed phrases related to their goals,

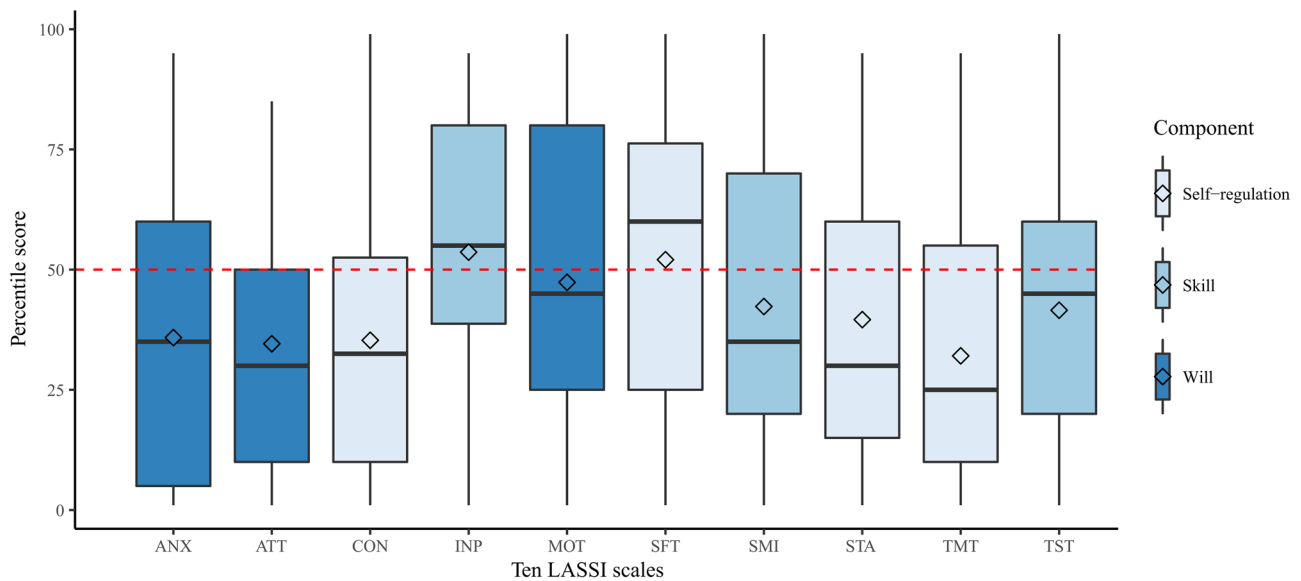


Fig. 1 Ten LASSI scales’ scores for the pre-intervention test ($n=81$). The horizontal dashed-red line shows the 50th percentile; students below this percentile usually need to improve their proficient study skills to succeed in college education

values, the meaning of success, the power of habits, intrinsic and extrinsic motivation, locus of control, learned helplessness, and fixed vs. growth mindset. The students received a “Value COMPASS” handout (values identification exercise tool used in Acceptance and Commitment Therapy) for home review to reflect on their values and personal goals [15].

Intervention 2 The second workshop built on previous knowledge and skills shared in the first intervention but focused specifically on time-management and prioritizing. The facilitators for this session were two USFQ faculty members from the Psychology and Education departments. This session included several active participation activities. Students had to identify experiences in which they lacked time to complete their responsibilities due to their deficiency of prioritization skills. During this intervention, a SMART Goal Template was distributed for students to use at home during their time organization. The SMART Goal Template is a guide for goal identification and prioritization that follows the acronym of specific, measurable, achievable, relevant, and time-bound [16]. The purpose of this tool was for participant medical students to develop habits of time management and priority recognition.

Testing Instrument

We developed a 9-item structured questionnaire to evaluate the impact of the two face-to-face workshop interventions on students’ study habits and time management skills and to identify personal and profes-

sional values. The study questionnaire was composed of two sections. Section 1 had eight items designed to retrieve participants’ perceptions regarding the utility of the two face-to-face workshops using a 5-point Likert scale. Three out of eight items of this section were dedicated to assessing the usefulness of the sessions (“extremely useful” to “not useful”), four about mindset and values (“totally agree” to “totally disagree”, in addition to an “N/A” option), and one about their ability to apply the SMART strategy to set goals (“all the time” to “never”). Section 2 used one open-ended qualitative question designed to allow the participants to reflect on their experiences and provide noteworthy aspects of the workshops. To ensure the consistency and reliability of the instrument, we conducted a two-step validation process. In the first phase, an expert in Survey Research and Methodology was invited to review and critique the instrument. The expert suggested changes in the Likert scale format and some of the question structure. The instrument was adjusted based on the expert’s recommendations. In the second phase, we invited five medical students in their fifth year of USFQ School of Medicine to run a pilot test. One final modification was done to the instrument after the pilot was complete.

Study Design and Data Collection

The present study used a cross-sectional and mixed-methods design nested in the USFQ LASSI research project. The sociodemographic survey was collected by REDCap platform at the beginning of the second semester (January to May) of the academic year 2019–2020. We used Qualtrics (online survey

software tool) to distribute the 9-item structured questionnaire among the USFQ LASSI research project's participants during the last week of May. Three reminders were sent in order to collect as much as possible the perceived impact of the implemented interventions to cope with quarantine distance learning due to COVID-19 (Fig. 2).

Statistical Analysis

Descriptive statistics was used to summarize the baseline characteristics of the study participants. Categorical and ordinal variables were described as counts and percentages. A thematic analysis approach based on concept-driven coding or deductive coding was implemented to analyze the qualitative section of the survey. Data analyses were performed using R v.1.1.463, for Mac (The R Foundation, Vienna).

Results

Table 1 shows that 78 third-year medical students completed the sociodemographic survey (~96.3% of the total students who signed the informed consent [78/81]). The mean age of the sample was 21.4 ± 1.2 years, 65% were female, and 6.4% combined studies with a formal job. Sixty third-year medical students responded to the 9-item questionnaire (74.1% [60/81]), answering both quantitative and qualitative questions to assess their perceptions regarding the usefulness of

Table 1 Demographic characteristics of the students surveyed

Characteristic	n=78
Age (year.), mean (SD)	21.4 (1.2)
Sex, n (%)	
Female	51 (65.4)
Marital status, n (%)	
Single	59 (75.6)
Relationship	19 (24.4)
Married	–
Occupational status, n (%)	
Yes	5 (6.4%)
Parenthood, n (%)	
Yes	1 (1.3)

the interventions for the academic and personal adaptation to the new learning modality (Table 2).

The first three questions referred to how useful the workshop sessions were to apply the learned skills during the COVID-19 confinement. From all the respondents, 48.3% (29/60) found that the interventions were extremely/very useful for improving time management skills, 65% (39/60) for organizing their tasks better, and 46.7% (28/60) for adapting to new study modalities. The next four questions explored how much the subjects agreed or disagreed with statements related to values and mindset, highlighted topics from the training. Regarding the use of the tools,

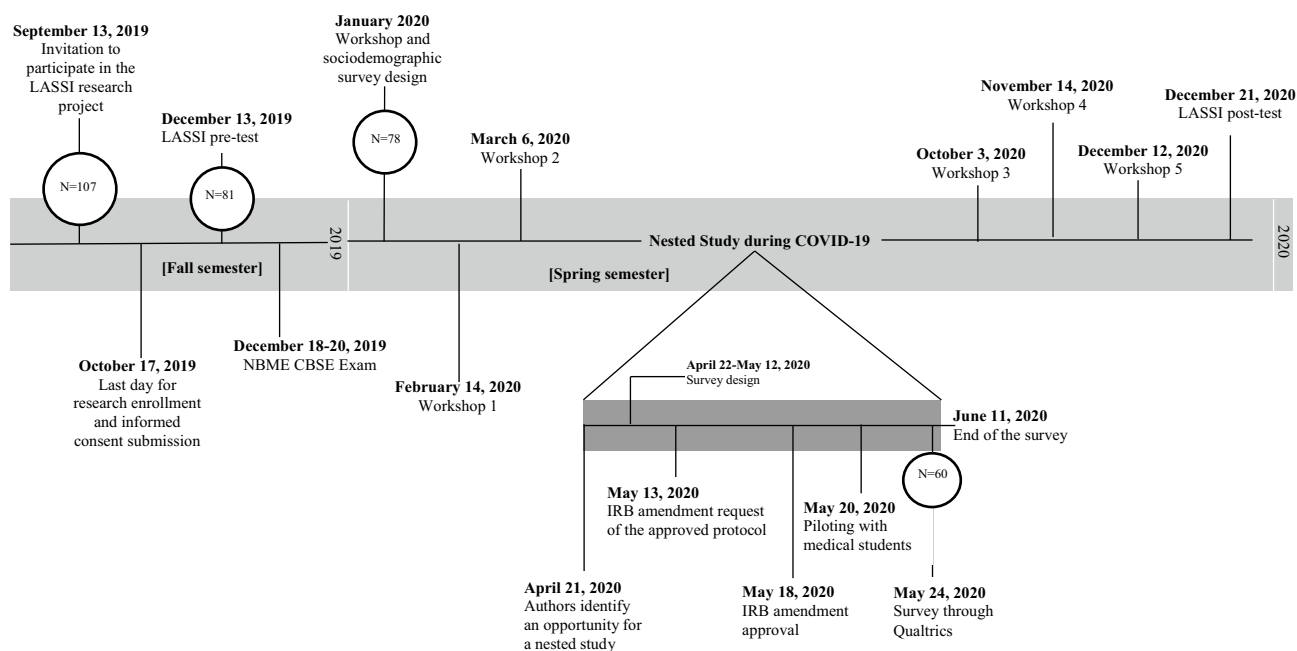


Fig. 2 Timeline of the LASSI USFQ research project execution during the academic year 2019–2020. The final study population of the nested cross-sectional design consisted of 60 third-year medical students located at Quito, Ecuador. LASSI Learning and Study

Strategies Inventory assessment; NBME National Board of Medical Examiners; CBSE Comprehensive Basic Science Examination; IRB Institutional Review Board

Table 2 Results of the online survey on a five-point Likert scale, $n=60$ third-year medical students

	Extremely useful (%)	Very useful (%)	Somewhat useful (%)	A little useful (%)	Not useful (%)	
How useful or not were the sessions so you can better manage your time during confinement?	8.3	40	38.3	11.7	1.7	
How useful or not were the sessions so you can better organize your academic activities during confinement?	8.3	56.7	33.3	8.3	3.3	
How useful or not were the sessions so that you can better adapt to new study modalities?	15.0	31.7	35.0	13.3	5.0	
How much do you agree or disagree with the following statements?	Totally Agree (%)	Somewhat agree (%)	Neither agree nor disagree (%)	Somewhat disagree (%)	Totally disagree (%)	N/A
The Values Compass helped me better determine my personal values	23.3	36.7	31.7	3.3	1.7	3.3
Knowing my values better was useful to face the challenges of confinement	36.7	31.7	20	5	1.7	5
During confinement, I have achieved a mindset focused on what I can control	35	35	16.7	11.7	1.7	
During confinement, I have achieved a mindset focused on my power to move forward	45	31.7	16.7	5	1.7	
During confinement by COVID-19, how often were you able to apply the SMART strategy to set goals (SMART: specific, measurable, achievable, relevant, and time-bound)?	All the time (%)	Most of the time (%)	Sometimes (%)	Rarely (%)	Never (%)	
	3.3	28.3	45	16.7	6.7	

60% (36/60) of the respondents found the value COMPASS tool useful in determining their personal values, and 68.4% (41/60) reported that knowing their values eased facing the challenges of confinement. Regarding their mindset during the confinement, 70% (42/60) of the participants felt they achieved a mindset centered on what

they can control, and 76.7% (46/60) displayed a mindset focused on their power to move forward. Finally, 93.3% (56/60) of the respondents applied the SMART strategy learned to set goals at least once during the confinement (Table 2).

The themes that emerged most noteworthy from the qualitative section of the survey were time management and ways to prioritize/organize activities. Students mentioned in the open responses that time management and organization were the most relevant PSSs learned from the interventions. Some of the remarks about time management include:

"The most valuable thing was learning how to organize my time."

"The workshops helped me a lot to organize my time, especially now that we all have to reorganize what we had previously planned. Personally, I had to prioritize other things like helping at home and in the family business, and it helped me take advantage of free time to do things that help me improve as a person, as a student and as a daughter."

"How I can organize my time and also countless other things have an influence since the stress that confinement produces and perhaps the fear of contracting the disease or that someone close to you will catch it causes me anxiety and stress. And I think that was an obstacle to be able to apply what they had taught us."

Regarding prioritizing, participants mentioned:

"I was able to identify and prioritize major tasks rather than less important ones."

"... many times staying at home obfuscated my ideas, but everything has been useful; [the ability to understand priorities] has helped me to maintain a structure in the 'What to do'."

"To be able to better organize my activities and prioritize according to how I see each one of them."

Discussion

The present study results highlight the positive impact of a structured program intervention built to strengthen PSSs in medical students during the distance learning modality in the midst of a global pandemic. The primary findings are as follows. First, approximately 50% of participants affirmed that the workshops were useful to improve time management, organize tasks, and adapt to the new study modality. Second, more than 60% of the students found the application of the provided tools during the interventions (SMART and COMPASS) useful to determine personal values and set a proper mindset for coping with distance learning during the COVID-19 pandemic. Third, the quantitative findings are congruent with the qualitative findings found in the thematic analysis regarding that time management and organization skills being the most relevant PSSs learned from the workshops.

These findings match well with contemporary literature published on the topic. For instance, a meta-analysis found that study skill intervention programs in general work most

of the time across different educational levels [17]. According to Adams and Blair [18], nonacademic factors that influence students' chances of attaining success in higher education are equally important and deserve investigation; thus, one potential skill is time management. It is worth mentioning that these interventional experiences were assessed during a non-pandemic time compared to the present study. We were surprised to find that with only two workshops' interventions, students were able to identify these workshops as positive and useful. Previous studies have shown that to achieve behavior change and acquire new skills, extensive interaction with a series of encounters is required [19, 20]. A possible explanation for this finding might be due to the abrupt change that the COVID-19 pandemic caused among USFQ medical students as everywhere. This unexpected event could have enhanced the memory retention and recall capacity of the study participants, so they were more likely to recall and apply the learned material during this confinement time [21]. Another possible explanation for this is that the home confinement could have pushed students to develop self-discipline skills to satisfy the semester coursework and other in-house duties. In this study, 48% of participating students perceived the interventions as extremely or very useful. This perception may be partly due to the pandemic situation, which made PSSs more relevant and appealing assets to acquire. Value identification was also perceived as a useful strategy by participants. Guiding students into the identification of goal setting and study planning appeared to significantly improve motivation towards learning, focus on academic priorities, which ultimately improve academic performance [22]. Results from this study highlight the importance of value identification, where 68.4% of the students totally or somewhat agreed regarding the usefulness of having received this training. Industries outside the academia claim that higher education is not adequately teaching students this valuable skill set [23]. Finally, one of the main findings from this research focuses on students' application of the provided tools at the interventions. Thus, 93.3% of the participant students used at least once the concrete tool SMART (goal setting tool) to help them prioritize activities and to develop proper time management skills. Literature reports that improving prioritization and time management skills are essential to obtain academic success [6, 10, 24].

Strengths and Limitations of the Study

We used a well-known and validated tool (LASSI test) to inform and plan our interventions. Hence, we were able to target core areas of deficiency that students benefited from the most according to the quantitative and qualitative findings. The mixed-methods approach allowed us a more complete and synergistic analysis of quantitative and qualitative data. Thus, we allowed participants to better

reflect regarding the utility of the workshops and ensured that our findings were grounded in the subjects' experiences [25]. This study collected data during a unique global health emergency that could provide invaluable lessons for medical science educators. Further, we used engaging interventions where the students were able to experience a hands-on implementation and practice of the taught material. Therefore, we believe that greater knowledge retention was achieved using this strategy compared to a passive implementation (reading notes or listening to lectures) [26].

Limitations of the current work must also be considered. First, the lack of continuity of the planned interventions due to the confinement does not allow us to provide outcome results. However, when the USFQ LASSI research project can continue its original plan, further and robust impact measures can be provided. Second, due to the used methodological design, we cannot claim the causality of the observed findings. However, as it was nested in a longitudinal study, the temporality bias does not affect the current findings as it usually occurs in regular cross-sectional studies [27]. Third, a limited number of interventions were implemented and assessed compared to similar studies evaluating the impact of learning skills interventions [17, 28]. Nevertheless, these studies were conducted during a non-pandemic time, so we do not know how an unexpected and abrupt event could influence memory and the learning process.

Implications of the Findings

This global pandemic we are facing now brings a lot of uncertainty and stress in several ways for undergraduate medical students. Pandemic crises are so incredibly fluid that plans can change rapidly [29]. Thus, training new physicians on how to adapt to new conditions, better time management, and prioritizing/organizing are much-needed skillsets for the future and not only to perform academically well. Especially in countries where medical students have not had to get a bachelor's degree first to apply to a medical school, these medical students may still lack the appropriate study strategies to succeed in a rigorous and fast-paced program [12]. Further, this study can offer various implications for higher education leaders and educators. Results from this research could potentially inform university policies to invest in structured study skills interventions to help with students' time management and goal settings skills and their academic performance. Investing time and resources to strengthen students' study skills can potentially impact academic performance and better assure resilience to unexpected situations like the

COVID-19 pandemic. The uncertain future ahead can easily set situations that require having tools to adapt to these potential changes. Higher education institutions have the responsibility to prepare students not only with academic and technical skills but with essential soft and life skills.

Conclusion

This world pandemic is an opportunity for higher education institutions to rethink the skills that allow students to adapt to new situations successfully. This study reviewed 60 third-year medical students' perceptions regarding the impact of a structured program intervention that offered study habits, time management, and prioritizing skills training. Overall, ~50% of participants affirmed that the workshops were useful to improve time management, organize tasks, and adapt to the new study modality imposed by the COVID-19 pandemic. Medical schools and higher education institutions worldwide could inform their decisions on the importance to formally include training of proficient study skills and interventions for students to gain tools and better adapt to uncertain situations in an ever-changing world.

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Author Contribution All the authors contributed to the study conception and design. Material preparation, data collection, and analysis were performed by Claudia Tobar, María S. Garcés, María C. Crespo-Andrade, and Ivan Sisa. The first draft of the manuscript was written by Claudia Tobar, and all the authors commented on previous versions of the manuscript. All the authors read and approved the final manuscript.

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Declarations

Ethical Approval Approval was obtained from the ethics committee of USFQ (Sep 2, 2019-113IN). The procedures used in this study adhere to the tenets of the Declaration of Helsinki

Consent to Participate Informed consent was obtained from all individual participants included in the study.

Conflicts of Interest The authors declare no competing interests.

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