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The Abrupt Educational Switch: Impact of COVID-19 and Lessons Learned for Health Science Faculty and Students

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Abstract

Purpose: The abrupt educational transition from in-class to virtual instruction during spring of 2020 found many faculty and students in uncharted territory. The purpose of this study was to survey both faculty and students in the School of Health Sciences to better understand the switch from face-to-face instruction to remote learning. **Methods:** Both qualitative and quantitative data was collected regarding this experience. The first task was to identify faculty's responses and actions taken, perception of alternative teaching experience and impact on student learning, determine needs to prepare and address new course design and delivery, and explore perception of changes to healthcare professions. The second task was to explore students' perceptions of their chosen health professions based on experience with COVID-19, their educational experience during Spring 2020, the impact of remote learning on clinical decision making/critical thinking with COVID-19 as a new reality in healthcare environments, and to identify anticipated needs for continued education with alternate course delivery methods. **Results:** The majority of faculty felt prepared for the switch, most delivered asynchronous course vs. synchronous interactive on-line classroom learning, and courses such as labs, clinicals, simulations and internships faced greater difficulties. Students reported that faculty did a good job of adjusting to remote learning, appreciated their level of accommodation and flexibility, especially given that almost two-thirds reported experiencing stress and anxiety during this time, felt prepared for this transition, but miss the face-to-face classroom experience. Based on experience with COVID-19, students' perceptions of future health-care careers were both positive and negative. **Conclusion:** The implications of results are discussed, "take-aways" and "best practices" provided, along with identifying limitations and future research.

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ABSTRACT

Purpose: The abrupt educational transition from in-class to virtual instruction during spring of 2020 found many faculty and students in uncharted territory. The purpose of this study was to survey both faculty and students in the School of Health Sciences to better understand the switch from face-to-face instruction to remote learning. **Methods:** Both qualitative and quantitative data was collected regarding this experience. The first task was to identify faculty's responses and actions taken, perception of alternative teaching experience and impact on student learning, determine needs to prepare and address new course design and delivery, and explore perception of changes to healthcare professions. The second task was to explore students' perceptions of their chosen health professions based on experience with COVID-19, their educational experience during Spring 2020, the impact of remote learning on clinical decision making/critical thinking with COVID-19 as a new reality in healthcare environments, and to identify anticipated needs for continued education with alternate course delivery methods. **Results:** The majority of faculty felt prepared for the switch, most delivered asynchronous course vs. synchronous interactive on-line classroom learning, and courses such as labs, clinicals, simulations and internships faced greater difficulties. Students reported that faculty did a good job of adjusting to remote learning, appreciated their level of accommodation and flexibility, especially given that almost two-thirds reported experiencing stress and anxiety during this time, felt prepared for this transition, but miss the face-to-face classroom experience. Based on experience with COVID-19, students' perceptions of future health-care careers were both positive and negative. **Conclusion:** The implications of results are discussed, "take-aways" and "best practices" provided, along with identifying limitations and future research.

Keywords: higher education, health science faculty and students, COVID-19; remote learning; and pandemic shut-down

INTRODUCTION

Over the last 20 years there have been several widespread viral diseases such as Severe Acute Respiratory Syndrome (SARS), 2009 swine flu pandemic from H1N1, Middle East Respiratory Syndrome (MERS), and Ebola virus, but nothing compared to COVID-19.¹ Currently, the world is experiencing a “once-in-a-lifetime pandemic, causing untold human suffering and death, unraveling of social relationships and robbing individuals of livelihoods and countries of prosperity.”² Since the onset of COVID-19, there have been worldwide lockdowns and intermittent disruption in all facets of industry, education, and livelihood. In January of 2020, The World Health Organization (WHO)³ declared the outbreak a “Public Health Emergency of International Concern” and two months later, it was deemed a pandemic.⁴ Globally, there have been 593,269,262 confirmed cases of COVID-19, including 6,446,547 deaths, reported to WHO. As of 17 August 2022, a total of 12,409,086,286 vaccine doses have been administered.

While COVID-19 restrictions varied among different countries, cities, and states, both the World Health Organization³ and Centers for Disease Control⁵ recommend practicing social distancing. Additionally, these organizations recommended that individuals wear masks and wash hands frequently to reduce the transmission of COVID-19. The state and local government implemented other precautionary actions as well which included temporary closure of many businesses and institutions such as: theme parks, bars, restaurants, casinos, retail stores, gyms, universities, K-12 schools, and national parks⁶. During this time, only essential businesses could remain open and therefore, many personal and professional lives were dramatically changed as a result of these non-essential closures.⁷

In March 2020, the United States experiences a lockdown due to COVID-19 which resulted in an unprecedented impact to the U.S. educational system. Specifically, during the peak of the first wave, 1.4 billion children across the globe, under the age of 18, were no longer permitted to attend school or childcare. This accounted for nearly over 55 million school children in the U.S.^{8,9,10} As stated in a recently published article,

“Even before K-12 schools closed, college campuses were sending students home to complete their semesters virtually. On March 6, 2020, the University of Washington in Seattle became the first major American college to shut down campus operations. Ten days later, over 250 U.S. colleges and universities followed suit and concluded their semester virtually. This sudden transition from in-class to virtual instruction found many faculty and students in uncharted territory.”^{6(p3)}

The purpose of this study is to better understand this unexpected and abrupt switch from face-to-face instruction to remote learning, academically and professionally for health care students. Survey research was collected from faculty and students regarding their experience during the Spring 2020 semester. Specifically, qualitative, and quantitative data were collected to identify faculty responses and actions taken, explore faculty perception of alternative teaching experience and impact on student learning. Specifically, the survey aimed to ascertain faculty preparedness, address new course design and delivery, and explore faculty perception of changes in various healthcare professions. Challenges related to use of online technologies to prepare students for clinical decision making, clinical internships, and professional practice in a healthcare system navigating a pandemic were also explored. Student data explored their educational experience during Spring 2020; specifically, perceptions of their chosen health professions, remote learning experiences on clinical decision making and critical thinking with COVID-19 as a new reality in healthcare environments. Anticipated needs for continued education with alternate course delivery methods was a major focus of the survey to ensure timely and effective changes in higher education

METHODS & RESULTS: FACULTY

Procedures

The Institutional Review Board approved the student and faculty survey research (#2020.083 and 2020.092) Thirty-seven faculty from a total 58 in the School of Health Sciences responded during May 26th to June 12th, 2020, to a 26-question survey (64% response rate). Specifically, faculty indicated their level of agreement on a 5-point Likert Scale to 13 questions regarding their perceptions of remote learning during the spring semester. In addition, faculty provided information about course delivery techniques they employed; rated 30 tasks as easy to difficult; indicated level of concern on a 5-point Likert Scale to 11 statements regarding educational issues; listed activities that were used for remote learning that were not originally planned; and provided reflection on teaching during spring 2020 by indicating level of agreement on a 5-point Likert Scale for 8 statements.

Participants

Table 1 provides descriptive statistics on 37 faculty responses that provided demographics and teaching modality for spring 2020.

Table 1: Faculty Sample

Demographics				
Gender	Age	Ethnic Background	Race	Department
71% female and 29% male.	36% (55-64), 26% (35-44), 19% (45-54), 17% over 65, 2% (25-34).	79% not Hispanic or Latino, 14% preferred not to answer, 4% Hispanic or Latino, 3% not specified.	76% white, 14% preferred not to answer, 5% Asian, and 5% Black or African American.	32.5% Health Sciences. 20% Nursing undergraduate; 15% Communication Disorders, 10% Physical Therapy, 10% Occupational Therapy, 5% Nursing Graduate, 5% Exercise Sciences, and 2.5% Public Health.
Teaching Statistics				
Course Load Spring 2020	Caregiver Status	Course Modality Prior to switch	Course Modality ¹ after the switch	
39% teaching 1 course, 30% 3 courses, 17% 2 courses, and 14% four courses.	58% of faculty provided care to high-risk persons, 40% did not, and 2% preferred not to answer.	64% of courses via face-to-face classroom and 17% as labs (81% in-person instruction).	42% synchronous virtual (in real time), 26% asynchronous virtual (not in real time), 24% asynchronous online, 5% alternate platform, 3% other, and fieldwork was canceled.	

Remote Instruction

Faculty perceptions regarding remote instruction during spring 2020 are noted in Tables 1 and 2. While the majority reported preference for face-to-face engagement, over half were prepared to teach the course remotely after spring break. However, they did report expecting less from the students and observed less participation and engagement from students with remote learning. Faculty also indicated they believed their course was still well received by students and were prepared to teach remotely in the fall. Reflecting on spring 2020 courses, overall, faculty felt they communicated effectively to prepare students for the change and a little over half were prepared for remote learning, but student grades were overall lower at the end of the spring 2020 semester.

For the purposes of this study, synchronous virtual (in real time) was defined as students being expected to attend a virtual class at a specific time; asynchronous virtual (not in real time) was defined as students watching a pre-recorded lecture or participating in class activities at a time convenient for the student; asynchronous online was defined as students being self-directed in completing activities posted online; and alternate platform was defined as using telephone, email, or paper packets to deliver course materials.

Table # 2: Faculty Responses

Questions	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
Overall, I was prepared to teach my Spring 2020 courses remotely when classes resumed after Spring Break.	5%	20%	15%	45%	15%
Stockton provided the information, resources, and tools I needed to teach remotely.	0%	5%	0%	45%	50%
I prefer to teach in face-to-face situations.	0%	5%	15%	20%	60%
I reduced my expectations for student learning and/or performance because of the disruptions caused by the pandemic.	10%	25%	25%	20%	20%

Questions	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
I observed a decrease in student participation and engagement after moving to remote instruction.	5%	20%	10%	55%	10%
My course was well received by students after the transition to remote learning.	5%	0%	15%	50%	30%
I will be prepared to teach remotely in the Fall if the need arises.	0%	15%	15%	45%	25%
If there is a modified reopening for Fall 2020, faculty should determine if their scheduled course(s) should be held on campus or remotely/online.	0%	10%	10%	25%	55%
Statement	True All Courses	True Most Courses	True Some Courses/False Some Courses	False Most Courses	False All Courses
I communicated effectively to prepare students for the change in course delivery.	74%	23	%3	0%	0%
During remote course delivery, I communicated effectively with all students in the class.	59%	35	3%	3%	0%
I skillfully used technology (Zoom, Blackboard, or other tools) for remote learning.	54%	37	3%	3%	3%
During remote delivery, I provided multiple methods for students to continue to communicate with each other and work together.	47%	31%	11%	8%	3%
The student learning in this class was negatively impacted by remote course delivery.	31%	14%	22%	19%	14%
My students appeared to be stressed by the pandemic.	44%	25%	8%	11%	11%
Students completed all of the work on the original syllabus for this course	47%	22%	14%	6%	11%
Student grades were lower as a result of the pandemic and/or move to remote learning.	0%	6%	11%	28%	56%

Faculty indicated the following activities were used for remote learning that were not originally planned as part of spring 2020 courses:

Table # 3: Course Activities

Course Activities	%
Gave tests/exams/quizzes online	63%
Electronically submitted papers/assignments	53%
Online or recorded presentations (individual or group)	47%
Assigned videos for students to supplement learning	42%
Online discussion board	42%
Students used digital resources to learn remotely	42%
Students viewed recorded lectures online	42%

Course Activities	%
Students were provided with text-based case studies from a textbook or the instructor	37%
Created/used simulation activities	32%
Students created a multimedia project (video, brochure, podcast, website, etc.)	32%
Students were provided with simulation or multimedia/video case studies	32%
Collected additional student feedback regularly (not the required IDEA/SCI)	26%
Students participated in live or recorded webinars/meetings with clinicians, client/patients, or guest speakers	26%
Used Respondus for tests/exams/quizzes	21%
Students completed physical projects at home (models, item construction/modification, etc.)	16%
Students were assigned online games	10%
Other: Used Zoom features for meetings or chat	10%
Students recorded skill performance to demonstrate skills required for the course	5%
Other: Take home exams & papers and talking to students by phone	5%

Course Delivery Techniques

Eighty one percent reported using Zoom for synchronous virtual course delivery. One faculty member reported using Blackboard Collaborate and one faculty member used Google Meet. Seventy-five percent of faculty reported that the majority of students attended class at the required time with one faculty member reporting that student attendance declined over the semester. Throughout virtual encounters with students, 13% recorded the sessions; of these recordings, 64% used PowerPoint narration features and 36% used Zoom. Seventy percent recorded lectures for asynchronous virtual course delivery. Faculty provided articles and text-based materials (70%), created videos, and used multimedia (50%) alongside discussion tools (50%) to promote student learning in asynchronous virtual course delivery. One faculty member used social media to engage students. Ninety percent of faculty reported that the majority of students completed the course in a timely manner. The majority of faculty (78%) reported using Blackboard for asynchronous online course delivery. One faculty member reported using Google Classroom and one faculty member used a publisher's platform. Faculty reported providing articles and text-based materials (78%), using discussion tools (44%), and creating videos and using multimedia (22%) to promote student learning in asynchronous online course delivery. Seventy eight percent of faculty reported that the majority of students completed the course in a timely manner.

Remote Instruction Tasks

Table 4 depicts faculty-perceived level of difficulty with specific tasks during remote instruction.

Table # 4: Task & Level of Difficulty (lower mean indicates more difficulty with the tasks)

Task – Difficult	Mean
Assisting students with labs, clinical rotations, internships, simulations.	2.33
Adjusting planned activities to a remote environment	2.47
Balancing family and work responsibilities	2.71
Teaching remotely	2.8
Managing my time	2.86
Task – neither difficult or easy	Mean
Recording or presenting lectures	3.07
Teaching course content	3.15
Grading	3.25
Obtaining digital materials for students (articles, books, videos)	3.31

Advising	3.33
Developing or changing quizzes/tests/exams to online format	3.35
Communicating with students	3.4
Identifying technology for teaching/learning activities	3.42
Task – Easy	Mean
Communicating with colleagues	3.57
Holding office hours	3.63
Using Zoom (or other video conference tool)	4
Responding to student emails	4.1
Using Blackboard (or other learning management system)	4.11

Faculty reported on usefulness of available resources, from moderately to extremely useful in providing support and assistance for spring 2020 and future remote teaching needs.

Table # 5: Available Resources

Available Resources	
Colleagues (Stockton)	97%
Information Technology Services (ITS)	97%
Center for Learning Design (CLD)	94%
My Academic Department (School of Health Sciences)	88%
Colleagues (outside of Stockton)	77%
Professional societies	74%
Publishers/Academic content providers	71%
Stockton's website	71%
Richard E. Bjork Library services	67%
Institute for Faculty Development (IFD)	58%
Third-party teaching/communication companies	57%
Stockton Federation of College Teachers (Union)	54%

Also, faculty indicated a level of concern about the following issues: faculty concerns were ranked highest to lowest (Table 6).

Table 6: Issues

Issues	Mean
Students having less interaction with faculty and other students	3.94
Amount of work involved in preparing a course for remote learning	3.83
Diminished student learning	3.78
Security for online testing (academic honesty)	3.75
Validating that a student is completing his/her own work	3.39
Evaluation of teaching effectiveness	3.33
Ability to design and deliver a productive and efficient course using online/technology tools	3.31

Issues	Mean
Online privacy	3.00
Ability to meet scholarly requirements for tenure or promotion	2.94
My technology skills	2.75
Ability to meet service requirements for tenure or promotion	2.61

Finally, faculty responses to questions regarding healthcare professions indicated a high level of appreciation for those in this profession, but a low opportunity for students to experience interprofessional education (IPE) with on-line learning (Table 7).

Table #7: Teaching Future Healthcare Professionals

Statement	Mean
As a result of this pandemic, I learned to have a greater appreciation of population health and well-being as an important aspect of health professions	4.29
My Spring 2020 classes focused on teaching students about clinical reasoning/critical thinking during difficult healthcare crises such as a pandemic	3.94
My Spring 2020 classes incorporated COVID-19 issues into the learning experience	3.88
I think student interest in training for a healthcare profession increased as a result of the COVID-19 pandemic.	3.48
During remote/online course delivery of the Spring 2020 classes I taught, there was adequate opportunity for students to interact online with other health professionals (IPE)	2.71

Qualitative Data

Sixty-eight faculty completed five open-ended qualitative questions. The most frequent response (38%) noted that the transition to remote learning was difficult for faculty and students and adjusting course delivery was challenging. One quarter noted the beneficial use of technology (i.e., Kahoot/polling) based on previous online teaching experience however faculty were concerned that virtual clinical learning is not equivalent to hands-on lab activities. Other comments from individual respondents requested better communication regarding options to prepare for remote learning, successful use of breakout rooms with smaller discussion groups and appreciation for instructional technology (IT) assistance to address technical issues. The following items should remain in place regarding best aspect(s) of teaching remotely/online:

- Majority of faculty found instructional technology to be useful with 32% reporting Blackboard group work such as projects, presentations, and discussion groups.
- 28% reported successfully used other tools successfully and included polling, publisher resources and apps.
- 16% found Zoom very useful to record courses with 12% planning to continue to pre-record lectures.
- Respondents (24%) indicated that organizing course content into learning modules was a good aspect of remote teaching likely to be repeated.
- 20% reported increased communication with students was beneficial and worth repeating. Smaller response rates indicated following the syllabus, giving exams and quizzes online, having a hybrid approach, and being flexible.

When asked what strategies faculty would not repeat from course remote delivery, the following was reported:

- The most frequent response (32%) indicated that remote teaching went well and there is “nothing” that was ineffective in teaching remotely.
- The use of the lockdown browser Respondus or lack of another security system for remote testing was indicated as an issue by 24% of respondents.
- 16% felt online course delivery negatively impacted students.
- Finding ways to engage students during remote delivery and assuring Zoom meetings/lectures were not too long was reported by 12% of respondents.
- Additional comments noted the need to find better supplemental resources and alternatives for lab activities and communication methods.

Faculty were asked to describe how they assisted students with critical thinking and clinical reasoning skills with changes in the course learning environment:

- Most frequent responses (32%) indicated the use of classroom discussions, adding resources such as case studies, simulations, and videos, or evaluating and emphasizing critical thinking and reasoning.
- 28% connected course content to the pandemic and current events.
- 28% indicated listening, offering advice and other supportive strategies was useful to students.
- Additional comments included increased group work, communication through detailed instructions and, enhanced understanding throughout the course experience.

Faculty were also asked to generate ideas to enhance clinical work experience if labs or clinical sites remain unavailable after spring 2020.

- 44% indicated case studies/simulation cases or video recording was useful for teaching clinical skills.
- The use of virtual meeting platforms or telehealth was suggested by 28%.
- Faculty (16%) expressed concern that clinical learning cannot be replaced.
- Additional comments included the importance of providing health education regarding the pandemic or using post-lab review assignments.

The last open-ended question asked faculty to describe how perceptions of their specific health profession was impacted by COVID-19. Faculty responded as follows:

- 32% indicated that job loss was experienced in the profession due to closure of clinics, reduced number of patients, hour reductions, furloughs, and the need to work with low staffing.
- Additional communication with the profession about unforeseen issues were noted by 24% of respondents.
- Some respondents (20%) indicated increased public awareness of their profession, appreciation/gratitude, and reassignment of job duties to meet needs of patients with COVID.
- Additional comments included greater awareness of mental health needs with enhanced compassion, effective use of telehealth, increased awareness of safety and lack of PPE resources. Two respondents indicated no change to their perception of the profession.

METHODS & RESULTS: STUDENTS

Procedures

A total of 536 out of 1,427 Health Science students (37% response rate), during the same time frame, responded to questions to explore the impact and perceptions of rapidly changing learning experiences as a result of the COVID pandemic. Specifically, students responded to 11 questions ("Yes" or "No") to report their experience regarding physical and mental health. Using a 7-point Likert Scale, participants indicated level of agreement to 5 statements regarding their educational experience with remote learning. Thirteen questions, using a 5-point Likert Scale were used to measure students' perception of course delivery changes and 7 statements captured students' qualitative perception of impact on learning and healthcare professions.

Participants

Demographics: Gender: 87% female, 12.5% male, .5% prefer not to answer; Age: 82.5% (ages 18-24), 14.6% (25-34), 1.6% (45-54), 1.1% (35-44), .2% over 55; Ethnicity: 79% not Hispanic or Latino, 10% Hispanic or Latino, 8% not specified, 3% prefer not to answer; Race: 78% white, 10% Asian, 7% Black or African American, 3% not specified, 2% prefer not to answer, .2% Native Hawaiian or Pacific Islander; Student Academic Standing Spring 2020: 15% freshman 17% sophomore 26% junior 19% senior and 23% graduate students; Residential Status: The majority of student respondents (60%) identified as a commuter, 37% as residential and 3% as other (off-campus graduate housing). Table 8 presents student majors.

Table # 8: Students' Majors

Program	%
Health Science (BSHS)	46.20%
Communication Disorders (MSCD)	10.27%
Physical Therapy (DPT)	9.51%
Occupational Therapy (MSOT)	7.98%
Health Science/MS Physician Assistant	6.84%

Program	%
Nursing- Prelicensure (4-Year)	6.27%
Exercise Science	4.18%
Nursing- MSN	3.80%
Public Health	2.09%
Nursing- Accelerated	1.90%
Nursing- DNP	0.76%
Nursing- RN to BSN	0.19%
Nursing- Post-Master's Certificate Program	0.00%

Quantitative Results

Descriptive statistics indicate that at the start of the spring semester, 34% of respondents were enrolled in five courses, 33% in four courses, 16% in three courses, 8% in six courses, 7% in two courses and 2% in one course. After the pandemic, 3% of students reported dropping or withdrawing from one or more courses. Twenty-one percent of student respondents reported participating in one or more clinical rotations/internships prior to the pandemic. Of the 75 students that reported ongoing clinical experiences, 47 (62.6%) indicated they had disrupted clinical rotations by the pandemic stay-at-home orders. Table 9 provides percentages of students' experiences during COVID-19 regarding physical and mental health. The greatest percentage of change was in mental health at the beginning of remote /online classes, followed by change in family employment and both an increase and decrease in physical activity. The table below shows percentages to all questions:

Table # 9: Student Reported COVID-19 Experiences

I got sick (COVID-19)	2%
I got sick (not COVID-19)	7%
One or more of my immediate family member(s) got sick (COVID-19)	10%
I or an immediate family member lost a paid employment position/job or had work hours reduced	56%
I experienced food insecurity (not enough money for food or lack of access)	7%
I experienced housing insecurity (not enough money for housing and related expenses)	5%
I increased my physical activity	40%
I decreased my physical activity	42%
I borrowed or purchased equipment/internet services to learn online	13%
My overall mood/attitude when remote/online classes started was anxious or stressed	72%
My overall mood/attitude when remote/online classes started was relief, calm, or focused	21%

Students also reported their experience with remote learning during the spring 2020, their perception of this new modality in teaching and the impact of learning on healthcare professionals. Table 9 provides average percentages for each set of questions.

Table #10: Student Survey Results

Student Perceptions of Spring 2020 Remote Instruction Experiences	Strongly Agree	Agree	Somewhat Agree	Neither Agree nor Disagree	Somewhat Disagree	Disagree	Strongly Disagree
I think the faculty did a good job changing my learning experience to remote/online learning	19%	31%	27%	8%	9%	4%	3%
I am a well-prepared student for remote/online learning	17%	29%	24%	10%	10%	6%	4%
I am a self-directed learner	14%	21%	26%	13%	12%	9%	5%
My interest in training for a healthcare profession increased as a result of COVID-19	19%	16%	18%	31%	6%	7%	3%
There was more work assigned when learning transitioned to remote/online delivery	20%	17%	19%	22%	8%	11%	3%
Student Perceptions of Course Delivery Changes						Mean (out of 5)	
I was satisfied with the learning experiences in this course when it moved to remote delivery						3.6 (Agree)	
My instructor communicated well and used methods that made me understand how to complete the course						3.98 (Agree)	
My instructor effectively used Zoom, Blackboard or other technology tools						3.98 (Agree)	
The instructor provided ways for students to continue to communicate and work together during remote delivery						3.79 (Agree)	
I am a student who likes to learn online						2.76 (Neutral)	
I was disappointed to miss learning activities that take place on campus (labs, practicums, simulations, class activities)						4.05 (Agree)	
I learned as much in this course as I would have learned if we remained in the original course delivery method						3.09 (Neutral)	
I think my grade is lower than what I would have earned if we were not in a pandemic						2.53 (Disagree-Neutral)	
When I consider other students in my class, I think I was better prepared to move to remote learning						3.36 (Neutral)	
My study habits and learning was not significantly impacted by the move to remote learning						2.65 (Neutral)	
I am satisfied with the feedback and support I received from the course instructor						3.92 (Agree)	
My instructor appeared to be stressed by the pandemic as evidenced from communication or how the course was Handled						2.91 (Neutral)	
We completed all of the work on our original syllabus in this course						3.64 (Agree)	
Student Perceptions of Impact on Learning & Healthcare Professions				Strongly Agree	Agree	Disagree	Strongly Disagree
My Spring 2020 classes adequately prepared me to work in my desired healthcare profession				26%	55%	13%	7%
My Spring 2020 courses incorporated COVID-19 issues into the learning experience				22%	49%	20%	10%
My Spring 2020 courses provided instruction on making clinical decisions				27%	43%	21%	9%
My Spring 2020 classes adequately prepared me to work in my desired healthcare profession				26%	55%	13%	7%

Student Perceptions of Impact on Learning & Healthcare Professions	Strongly Agree	Agree	Disagree	Strongly Disagree
My Spring 2020 courses focused on teaching me about clinical reasoning/critical thinking during difficult healthcare crises such as a pandemic	21%	47%	22%	11%
My Spring 2020 courses focused on teaching me how to locate reliable sources of information during difficult healthcare crises such as a pandemic	24%	42%	25%	8%
As a result of this pandemic, I have a greater appreciation of population health and well-being as an important aspect of my profession	51%	44%	2%	2%
During remote/online course delivery, there was adequate opportunity to interact online with professionals in the field	19%	33%	32%	16%

Qualitative Data

Student surveys contained 8 open-ended questions. On average, 156 students responded (113-217 range) to these open-ended questions. Open-ended questions indicated frequency of responses for each question. The first question asked students to provide any additional information related to the experience with courses moving to remote/online delivery. Of 113 narratives, frequency of responses is highlighted below:

- 34% felt professors were not prepared and greater communication was necessary to mitigate a negative experience.
- 20% felt that professors displayed understanding, transparency and helped foster the transition for students.
- Students' narrative included various limited resources (17%) with 6% encountering technical issues.
- Overall, 54% stated the change in work environment to home was challenging with 6% struggling to adapt, which resulted in stress and anxiety.
- Sixteen percent enjoyed the online experience however, 11% would prefer a return to the classroom in the fall 2020 semester.

Question two inquired about the impact of COVID-19 on the perception of students' chosen profession. From the 217 student responses, the following emerged:

- 50% stated COVID-19 fostered a positive outlook on their chosen profession.
- 26% perceived a negative outlook.
- 26% expressed ambiguity about the future of their path (due to fear of risk and other healthcare and political and structural underpinnings).
- 26% reported the concern about "hands-on learning" through field work or clinicals, with 7% sharing the need for telehealth implementation of services.

Students were asked about the potential for employment for their chosen profession. Results revealed the following:

- Overall, 36% report a positive outlook on their chosen profession.
- 45% report a negative or ambiguous outlook with a concern of safety and risk-taking given paucity of PPE.
- 25% felt as though employment could be favorable while 9% believed employment would be affected by COVID-19 once again requiring the shift to telehealth (5%) and greater need to be prepared for another outbreak (6%).
- 18% stated no new insights based on the pandemic.

Qualitative data also provided insight into the major positive and negative changes in students' personal educational experience as a result of COVID-19. These results were varied:

- 38% of the 194 comments noted positive changes and adapted well with an improved outlook and more time to do work from home.
- 74% found learning much more difficult with less interactive learning and group work. This created a sense of unpreparedness for "the real world".
- Challenges encountered included the change in environment (14%) and less resources (12%).
- 12% stated faculty impacted learning with increased material and were notably unprepared on Zoom.
- 16% felt as though they did not learn as much as they should have based on the pivot to remote teaching. This was due to an inability to attend to long periods online and mental health issues of anxiety and depression (26%).
- 23% expressed a concern about the lack of hands-on experiences in the classroom or clinical setting which was a major concern throughout many graduate student comments.

Students were also asked how the instructor provided learning experiences that focused on making healthcare decisions while considering COVID-19. Results of 199 responses are as follows:

- 78% engaged in discussions about the pandemic directly through class sessions.
- 25% received various resources incorporated into discussions.
- 24% reported direct application to learning through assignments and direct professional case examples and professors shared their experiences.
- COVID-19 was not discussed in 13% of student responses.

When students were asked about the best aspects of this type of learning, 90% of 184 students appreciated the online Zoom platform with pre-recorded lectures and recorded Zoom for later reflection. Specifically, 11% desired more group discussions and more resources with hands on experiences (11%). Students wished for better communication with faculty (12%) through greater compassion and understanding in a new platform of learning (11%). Twelve percent would not change the way courses were delivered. When asked to consider the most negative aspect of the remote/online learning experience, 45% of 170 respondents wanted greater understanding, flexibility, and better communication with faculty. Students felt faculty encountered difficulty with online format and reported challenges with lack of syllabus structure and clarity (10%), lectures were too long or unmotivating (7%) alongside technical issues with exams (7%). Eleven percent were disappointed about the lack of hands-on lab experiences while six percent wished to return to classroom venues for learning. Finally, students were asked for suggestions regarding how Stockton can improve their healthcare professional education experience. Sixty-four respondents (40%) indicated no specific need for improvement, 34% percent desired greater attention focused on the hands-on experience including labs and clinicals. Twenty percent desired better communication with faculty with more prompt responses with greater understanding and flexibility as the pandemic changed on a day-to-day basis.

DISCUSSION

Institutes of higher education have never experienced the type of abrupt educational switch that occurred during the spring 2020 semester due to COVID-19. The purpose of this study was to survey both faculty and students in the School of Health Sciences to better understand the unexpected switch from face-to-face instruction to remote learning. Based on faculty and student self-report quantitative and qualitative data, the university was able to reflect on changes in technology and delivery of coursework through the remainder of the semester and plan accordingly for the summer and fall semester experiences.

Faculty Data

These data point to a rich understanding of how faculty transitioned their courses upon closure of the university in March 2020. Specifically, the majority of faculty felt prepared to teach remotely (60%); 42% changed from face-to-face courses to synchronous virtual courses, while a little over 50% offered asynchronous courses; 5% used other means such as email or phone to continue class activities; and 3% were cancelled, because of the nature of on-site fieldwork did not include students, but only essential workers. Data indicates Zoom and Blackboard were widely used by faculty and a majority recognized student stress and negative impacts on student learning during spring 2020. In addition, faculty used online testing, electronic submission of assignments, online recorded presentations, assigned video viewing, online discussion boards, digital resources and recorded online lectures as the most frequent substitute for planned in-person course activities during spring 2020.

Based on these results, future efforts should focus on increasing faculty knowledge and skills regarding remote active learning and the use of technology to facilitate learning for diverse learners. Based on the spring 2020 experience, institutions should procure technology and offer training resources in advance of a need to allow transitions from in-person to remote learning to be more successful. In addition, the survey data supports the consideration of strengthening the faculty role in identifying and assisting students who are experiencing mental health issues or demonstrating at-risk behaviors through University programs as well as planned course design and delivery.^{11,12} Further evaluation of faculty success and student learning using online activities to replace in-person planned activities should be an iterative process. Finally, institutions should continue efforts to survey and assess educational response during the pandemic, especially now that a new health emergency, monkeypox (MPX) is another disconcerting health emergency on the rise in the US. The lessons learned from COVID-19 should establish quick and nimble attention to allaying similar fears and concerns for faculty and student health professionals.^{13, 14}

Faculty experiences, across courses, during spring 2020 COVID-19 provided data about their teaching and the impact on student learning. Specifically, data indicates that faculty report 90% of students completed asynchronous virtual courses in a timely manner followed by 78% of students in synchronous online classes. Faculty also report the majority of students attended synchronous virtual courses in 75% of courses offered. As a result, student engagement and participation may be enhanced by well-developed asynchronous course designs providing students with flexibility to work under optimal conditions based on the effects of the pandemic. In addition, future research should evaluate student perceptions, as described in student surveys, for alignment with

faculty perceptions. Opening classes with the latest concern regarding protection from monkeypox virus (MPXV) is essential and all universities should be transparent with the campus community and establish an open policy and procedure to mitigate outbreaks. Finally, institutions should promote faculty support, solutions, strategies, and training that increase students' learning performance and satisfaction, promotes interaction (social /community), protect academic honesty/rigor and help faculty balance a workload (efficiently use time) to develop effective learning opportunities/courses that provide a distinctive university experience.

As COVID-19 and other health emergencies continue to impact higher education, faculty data from this study provide support for several other recommendations to determine faculty needs to prepare and address course design and delivery. Specifically, data reported that only 58% percent of faculty respondents are or provided care to high-risk individuals in the family. Also, faculty reported that teaching remotely, adjusting planned course activities to remote teaching and assisting students with labs, clinical rotations, and simulations were indicated as some of the most difficult tasks. In addition, the top five resources faculty reported as being most useful in supporting needs related to remote teaching include: Stockton colleagues, Information Technology Services (ITS), Center for Learning Design (CLD), School of Health Sciences, and colleagues outside of Stockton. Thus, it is important for institutions to realize and address faculty needs and alternative strategies for student lab and clinical courses since they report these are more difficult to adapt to remote learning. For example, institutions should be prepared to provide enhanced resources on simulation activities, telehealth, and safe alternatives to clinical experiences. Furthermore, faculty require support and wellness strategies to manage new teaching requirements and mental health needs during a pandemic including time management and balancing work and family responsibilities. Overall, continued support at all levels, will help ensure that faculty can maximize the use of resources identified as most useful in preparing and delivering courses that promote inclusive student success. Finally, future research should explore faculty perception of changes to healthcare professions and challenges related to the use of online technologies to prepare students for clinical decision making, clinical internships, and professional practice in a healthcare system navigating pandemics and health emergencies.

Student Data

Based on student survey data, the following provides a summary of their experience during spring 2020, along with recommendations derived from these results. First, students' educational experiences, based on changes in higher education due to COVID-19, revealed that 72% of the sample reported being anxious or stressed with the start of remote learning. Also, 56% sample posited that they and /or their family members experienced loss of jobs/income as a result of the pandemic. As far as their academic classes, 77% of students reported faculty did a good job adjusting the course to remote learning with 70% of students were well-prepared for online/remote learning. Fifty six percent of students indicated there was more work assigned when courses were offered remotely. Overall students agreed with statements indicating remote courses were effective but were disappointed to miss learning activities that take place on campus or in the community (labs, practicums, simulations, class activities).

Based on these findings, the authors recommend the following: First, institutions should focus on efforts to increase multiple methods of communication with students supporting personal and educational needs. Also, universities and colleges should procure technology and offer enhanced communication from faculty as well as training resources in advance to improve cutting edge remote learning. Administrators should consider Institutional responsibility to prepare students for remote/online learning (e.g., How are students learning about Blackboard? Zoom? Educational technology?). Similar to continued evaluation of faculty, further evaluation of student learning during any health emergency is needed; especially a mixed methods research approach to assess educational response during the pandemic for all university learners.

Student data that focused on identifying student anticipated needs for continued education with alternate course delivery methods also provided valuable information. Students indicated a desire to have courses that use Zoom and provide recorded lectures and group discussions and requested more hands-on activities (active learning) and ways to complete clinical experiences. Students desired faculty communication, organization, empathy, flexibility, and clear instructions. Students did not benefit from long, unmotivating, boring lectures and some students reported frustration with proctored exams (or technology issues) notwithstanding a preference to return to the classroom experience. Based on these results, the following recommendations are suggested to help faculty meet students' needs: provide a safe campus environment for courses/labs, commit to developing policies/procedures to ensure academic honesty addressing issues with online testing, and provide support and wellness strategies to help students manage new learning requirements and mental health needs during a pandemic.

Student data regarding perceptions of their chosen health professions based on current experience with COVID-19 provided mixed results. Half stated the impact of the pandemic fostered a positive outlook, while the remaining students perceive a negative outlook or expressing ambiguity about the future of their profession. Future efforts should be made to communicate evidence-based information to quell fear of COVID-19 and emerging health concerns including MPXV and openly discuss the challenges in our healthcare system alongside a policy and economic backdrop. Also, institutions (faculty, staff, and administrators) should

encourage relevant discussions on the changing landscape of healthcare. Finally, future efforts should explore the impact of remote learning experience on clinical decision making and critical thinking with unforeseen infectious diseases, including COVID-19 and MPXV as a new and regular reality in healthcare environments. The pandemic had positive and negative impacts on healthcare students' professional perceptions and experiences with clinical decision making, which needs further investigation.

CONCLUSION & IMPLICATIONS

While this study has limitations related to sampling and generalizability, it provides valuable insight into the educational shift of spring 2020. Based on the results of this study, the authors created the figure below which provides "Take Aways". The knowledge gleaned from this studies quantitative and qualitative data also identified future action items and suggestions for best future practices (Table 11).

Table 11. Take Aways, Action Items, and Best Future Practices

Take-Aways	Action Items
Instruction was more remote, than interactive; increased amount of work with remote than face-face instruction.	Need more interactive remote instruction: recorded lectures, opportunities for group discussion, and on-line activities to engage students; along with a need to address issues with on-line testing – technology and academic honesty issues.
Clinical courses, labs, fieldwork, internships had unique difficulties.	Need for a safe environment for labs; alternatives for clinicals, fieldwork and internships.
Students agreed that faculty transitioned well, and they were grateful for their extra time and effort.	Students indicate a desire for clear communication, organization, empathy, and flexibility from their instructors.
Students felt well- prepared for remote, but mental health was a key factor in their learning process.	Provide support and wellness strategies to help students manage new learning requirements and mental health needs during a pandemic.
COVID-19 / Pandemic had both positive and negative impact on students regarding their future in healthcare.	Evidence-based information for fears / questions about COVID, along with opportunities to discuss the changing landscape of healthcare.
Best Future Practices	
<ul style="list-style-type: none"> • Flexibility & Resilience • Collaboration - faculty and support services • Inclusive/Trauma-Informed Pedagogy (student-centric recognizing underserved populations) • Prioritize live teacher and peer interaction • Identify & implement strategies that explicitly address student social, emotional, and mental health needs • Provide rigorous and rich content ensuring quality of educational materials, not just quantity of workload 	

Overall, one major finding highlights the need for new course designs and instructional modalities, especially for students in the health sciences. This is supported by research calling for innovation regarding the intersection of lectures, laboratory experiences and service learning requires a reflection on successful delivery of information, especially as it relates to healthcare and future research is needed.¹⁵ Suggestions to address this new platform with the goal of greater on-line engagement may include sharing with students, in advance, a list of expectations concerning an upcoming lecture (e.g., keeping cameras on, muting microphones when not speaking, and, when possible, minimize environmental distractors). Educators should be aware that this is key to establish common ground for the class, making the experience much more engaging and productive.

Specifically, after the campus closing, most students joined online live sessions; but they did so as passive listeners. This study supports this premise. However, some instructors did try to encourage interactions by embedding a human assistant in the online virtual lectures, on-line conferences (set up like face-to-face instruction) and office hours.¹⁶ The premise (based on Albert Bandura's

social learning theory)¹⁷ is that learning through modeling, or observational learning, may persuade students to imitate the assistant graduate teaching assistant, an undergraduate student, or a peer leader who is engaging in the lecture and to also answer questions and write comments. The results were positive, and students could not only interact during live sessions, but then go back and watch the recording.¹⁸ Therefore, future research should continue to explore and assessment the impact of these strategies and tactics on student learning and advocate increase implementation within the classroom.

Additional items of concern for future virtual instruction may be class logistics. For example, one area of concern that was identified was regarding question-and-answer timeframes / students' comfort level with interrupting the speaker. Thus, instructors could make use of the chat and consider a second monitor in the room coalescing these details with regular pauses for reflection and clarification. Also, end of session "take-aways" may provide summary reviews and assessment of knowledge. Finally, there are several options in terms of audience polling applications, which facilitate live interactions with the listeners and may be particularly useful during online teaching involving large classes.¹⁹

Overall, this study illustrates how pandemics have a catalyzing effect on emerging changes in society and education. Results from this survey study highlight how optimizing best learning outcomes can foster creative learning strategies in higher healthcare education. As instructors move forward, ongoing research will help guide them to increase students' cognitive, affective and behavioral learning - both in healthcare and other educational fields.

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