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Pre-, During-, and Post-COVID-19: Students' Evaluations of Instructor Preparation and Course Delivery

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Abstract : The spread of SARS-CoV-2 (COVID-19) affected the global education system. Traditional face-to-face learning was disturbed while online learning was employed to continue education without interruption during the pandemic. Instructors and students faced unexpected challenges in preparation for their routines, and course preparation and delivery, class attendance, and knowledge receipt were influenced by their attitudes, experience, and adaptation to the new setting. The purpose of this study was to investigate how students embraced changes in course modification and instructor preparation from the pre- to post-COVID period; 212 undergraduates and 24 postgraduates enrolled in engineering courses were given a multiple-choice questionnaire including an open-ended feedback form. The questionnaire included instructor-wise and course-wise parameters measuring the instructor's interest/dedication, effectiveness, encouragement, assessment quality, and delivery of course material, and the overall organization, knowledge, and quality of the course. Despite limitations of the study, the students rated the instructor and course as having higher quality during the post-COVID period than before the pandemic, suggesting that the effective use of both face-to-face and online techniques created a better learning environment. The undergraduate students observed the continuous development of the instructor and course in the transition period; however, only online learning during the pandemic produced low satisfaction among the postgraduate students.

Keywords: Assessment, COVID-19, Course, Engineering, Instructor, Questionnaire

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1. Introduction

The outbreak of SARS-CoV-2 (COVID-19) was borderless and affected the education system worldwide, regardless of an institution's ranking. Prevention measures such as handwashing, face masking, social distancing, and restricting mass gatherings were advised to minimize the spread of the disease. However, due to practical difficulties or, in some cases, the outright ineffectiveness of those preventive measures, lockdown and staying-home strategies were eventually implemented, which negatively affected conventional education systems around the world (Sintema, 2020). Higher education institutions started implementing new teaching and learning strategies in this new mode of social interplay. They had to respond quickly to an environment in which using a traditional in-person classroom was more challenging or impossible

(Bryson & Andres, 2020). E-learning tools were key during this pandemic, and helped higher education institutions facilitate student learning during the closure of universities and colleges (Subedi et al., 2020). Information technology tools including software were used to develop synchronous and asynchronous learning systems (Larasati & Santoso, 2017; Lim, 2017). Moodle, Canvas, and Blackboard are examples of deep-rooted distance learning tools that were developed to facilitate real-time student–teacher interactions, and such platforms are not new to higher education in the developed world. However, other than for distance learning, these tools had not been used for synchronized learning before COVID-19, but were commonly employed for delivering lecture notes, announcements, assignments, and so on. On the other hand, educational institutions in the developing world adopted synchronous learning via video conferencing tools, such as Zoom and Skype, due to their financial difficulties (Janghorban et al., 2014; Kohnke & Moorhouse, 2020). A blend of synchronous and asynchronous approaches is required to reproduce all in-person instructional activities in tertiary education systems in a completely virtual environment (McDaniels et al., 2016), and different subjects and age groups require different approaches to online learning (Doucet et al., 2020). Some fields, such as engineering, were not fully successful using online learning because, for example, lab components requiring hands-on experiences could not be recreated effectively with distance learning. While students are encouraged to consider online learning a "new normal" environment, faculty need to be supported with teaching tools and facilities accordingly. Young faculty quickly adjusted to this new digital era; however, older faculty with a fixed mindset found it difficult to adapt, and their teaching efficiency dwindled. Online learning limited the physical activities of students despite giving them more freedom to participate in virtual learning (Basilaia & Kvavadze, 2020). However, Irawan et al. (2020) reported that students experienced physiological effects during online learning, such as boredom, heightened anxiety due to having more technical issues (poor internet connection) and fewer resources, and mood changes in response to online assessments that they consider to be ineffective (e.g., typing issues/response speed in examinations).

For more than half a century, higher education sectors have been employing student-judged course evaluations as a key tool for assessing teaching effectiveness (LeBlanc, 2021). Course evaluation surveys have been an essential part of the US education system since the 1920s (Dommeyer et al., 2004). Student evaluation of teaching and course materials is useful for instructors to improve their teaching and better prepare the course structure. On the other hand, the evaluations are used by universities in assessing course effectiveness, despite evidence of their limited validity (LeBlanc, 2021). During the COVID-19 period, course notes, assignments, and assessments were substantially revised according to the requirements of online platforms. Ease of use of the online platform, quality of the information provided, service quality, and instructor quality were factors contributing to student satisfaction with online learning (Al-Fraihat et al., 2020). Students were enthusiastic to obtain the necessary skills to use technology for education (Poláková and Klímová, 2021) and discovered the convenience of online learning in response to emergencies during the pandemic (Jin et al., 2021). However, student satisfaction with online learning was affected by a lack of interest (Yang et al., 2020), anxiety about the use of computers, delivery quality (audio and video quality; Sun et al., 2008; Mendoza et al., 2021), and lack of direct emotional communication (Cheng, 2020). In response to the COVID-19 outbreak, the rapid transition from traditional face-to-face teaching to online teaching significantly disturbed the roles of instructors, as well as their personal lives (Watermeyer et al., 2021). Clear differences were observed between instructors who had prior experience with online learning and those who did not (Adedoyin & Soykan, 2020), and the latter received unexpected evaluations from students at the end of the course. However, Hernandez et al. (2012) reported that student performance and course satisfaction were generally enhanced with online teaching, implying that the changes implemented had succeeded, and the lessons learned would be guide post-COVID curriculum improvements.

While previous research has focused on the impact of COVID-19 on the transformation from face-to-face learning to online learning, and student and instructor preparation for online education during the pandemic, the literature on changes in students' perspectives of instructor preparation and course delivery from pre- to post-COVID is limited. The present study investigated this area by researching how students accept or reject changes in course modification and instructor preparation from the pre- to post-COVID period.

The research question guiding this study is as follows: To what degree has instructor and course preparation affected student satisfaction during the transition period from pre-COVID to post-COVID?

2. Materials And Method

This study was conducted using end-of-course evaluations in a public university in the United Arab Emirates. Undergraduate and postgraduate students registered in a civil engineering program were selected as the sample. One class of undergraduates and one class of postgraduates during the years 2019, 2020, and 2021 (six classes total) were selected to represent the pre-, during, and post-COVID periods, respectively. The university had full face-to-face learning in 2019 (pre-COVID), full online learning in 2020 (during COVID), and full face-to-face learning in 2021 (post-COVID). The number of students in each class differed. The students were requested to evaluate the instructor and course using a multiple-choice questionnaire. The instructor was the same for the duration. Although the course titles differed for undergraduates and postgraduates, the course content was similar and addressed the fundamentals of civil engineering fluid mechanics and water resources. The courses were delivered in the spring semester each year. The evaluation was done online on Blackboard (a web-based application) for two weeks and ended at the close of the course. The evaluation period was the same for each tested year. The students confirmed that their responses were anonymous. During the assessment period, the instructor tracked the response rate and encouraged the students to complete the questionnaire. The faculty member was advised to remind the students for the participation but strongly discourage giving the students any types of incentive to accelerate the response rate and get higher rates. The population size was 212 undergraduate students and 24 postgraduate students. Most of the undergraduate students were local (95%), whereas most of the postgraduate students were international with different ethnic backgrounds (80%). All were invited to complete the questionnaire; however, the response rate from the undergraduates was significantly lower than that from the postgraduates (Table 1).

Table 1: Number of students and their response rate to the questionnaire

Year	2019	2020	2021
Undergraduate course	22 (9.1%)	37 (24.3%)	58 (13.8%)
Postgraduate course	7 (71.4%)	8 (62.5%)	9 (44.4%)

3. Course Material, Delivery From Pre- To Post-covid, And Assessment

The undergraduate and postgraduate courses covered topics on fundamentals of civil engineering fluid mechanics and water resources. The course content discussed the use of conservation of mass, energy, and momentum, and the application of them to understand phenomena in the field. The students were expected to have decent mathematics knowledge to take the courses. The courses had textbooks; however, lecture notes were the main learning material. Lecture notes included derivations of theories, direct examples, critical thinking examples, aptitude examples, and applications. The course learning outcomes were assessed using several tools: quizzes, homework, midterm examination, and final examination. In addition, the undergraduate course had a lab component where the students conducted experiments and submitted the results in a report, whereas the postgraduate course had a term project where the students reported their findings on a selected topic in a report and presentation.

In 2019, the lectures were conducted face-to-face in a classroom. The lecturer used a whiteboard (electronic) to deliver the content. The students received hard copies of their textbooks. the lecture notes and syllabus were uploaded to Blackboard where the students could download them. Announcements were given verbally and posted on Blackboard. All the assessments were face-to-face, paper-based, and hard copies were submitted. The lab work was hands-on and presentations were conducted face-to-face. Office hours were also face-to-face.

In 2020, the university was closed to students due to the outbreak of COVID-19. The instructor was advised to work from home or given restricted access to the university. The online learning system was set up through Blackboard – the students attended online classes from home while the instructor delivered the courses from either their home or office. The instructor and students did not see each other, and the students only listened to the lecture and referred to the notes on the screen. The instructor was provided with writing pads and hands-free communication systems (Jabra GN) to facilitate teaching. Lecture notes were revised with many examples to fit online learning. Video demonstrations (e.g., posted on YouTube) were heavily used. The recorded online lectures were uploaded for the students and they were available until the end of the semester. The assessments (quizzes and

examinations) were conducted online through Blackboard, and invigilation was conducted through a video camera on the student's device. Lab experiments were hands-off, recorded video demonstrations and data were provided. All the other activities including presentations and report submissions were conducted online.

In 2021, the university returned to normal conditions as in 2019 and resumed face-to-face learning. The revised lecture notes (2020) were merged with the old lecture notes (2019) to develop more comprehensive notes. The voice-over recorded lectures (pre-made lectures with high-quality voice and visuals) were uploaded to Blackboard after every face-to-face lecture. The textbook was available both in online and hard copies. The students were supplemented with online tools (virtual labs, numerical modeling) to enhance their knowledge on the subject. Most of these amendments resulted from the lessons learned during the COVID-19 period.

4. Evaluation Questionnaire

The questionnaire was divided into two sections. The first part (13 questions) was used to evaluate the instructor, and the second part (6 questions) was included to evaluate the course. The students selected the best answer to each question, choosing from: 5 "strongly agree," 4 "agree," 3 "neither agree nor disagree," 2 "disagree," and 1 "strongly disagree." Using the questionnaire, the students evaluated the instructor's qualities, such as interest/dedication (Q1–5), effectiveness (Q6–7), encouragement (Q8–9), assessment quality (Q10–12), and delivery (Q13), and course qualities, such as organization (Q1–3), knowledge (Q4–6), and overall quality (Q7). In addition, the students were permitted to write their opinions/justifications in open-ended feedback. The mean rate of answers for each question was calculated using the grading scale. Different regression lines were tested to fitting the mean values. Despite the scattering of individual data, the gradient (shape) of the regression lines was used to analysis the students' evaluation on the instructor and course during the transition period.

5. Results and Discussion

The mean ratings on each question for pre-, during, and post-COVID were plotted for the instructor and course (Figs. 1 and 2, respectively). The best-fit linear curves of the mean values were used to explain the

Question Number	Instructor Evaluation	Course Evaluation
1	The instructor was always well-prepared for classes.	The course material was effectively organized.
2	The instructor made effective use of the class time.	The course activities and assignments were helpful in learning.
3	The instructor was available during the office hours.	The course workload was acceptable.
4	The instructor treated students with respect.	The course content addressed real-life experiences.
5	The instructor communicated the course outcomes.	The course helped me to improve my thinking skills.
6	The course outcomes were achieved.	The course added to my knowledge.
7	Various teaching methods were effectively implemented.	Overall, the course was of high quality.
8	Students were encouraged to ask questions, participate and raise their interest in the course subject.	
9	Students were encouraged for independent and critical thinking.	
10	The instructor provided clear and constructive feedback on assessment tasks.	
11	Different methods were used to evaluate the student's performance (assignments, quizzes, projects, exams, etc.)	
12	The instructor evaluated students fairly.	
13	The instructor delivered this course with high standards.	

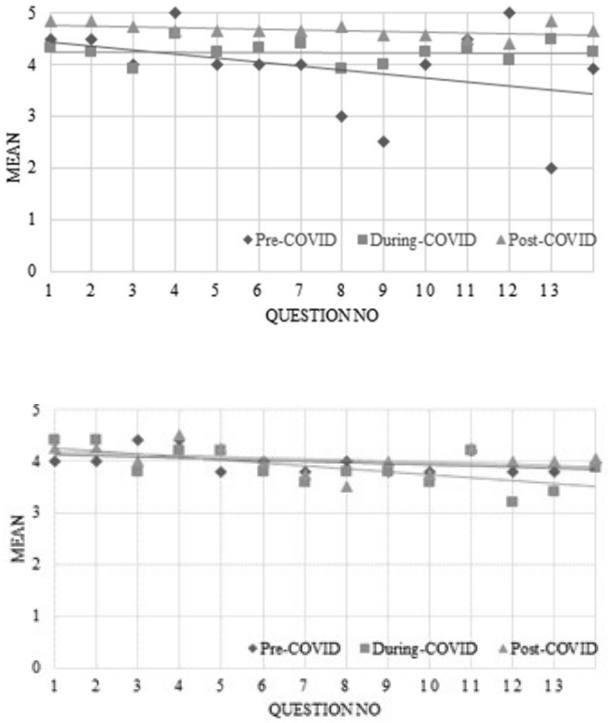

Fig.:Instructor evaluations; (a) undergraduate course, (b) postgraduate course. The last data point in each graph is the mean of all responses.

results after several iterations. Fig. 1 shows the student evaluations of the instructor for the undergraduate and postgraduate courses in the pre-, during, and post-COVID periods. Both the undergraduate and postgraduate students had greater satisfaction with the instructor in the post-COVID period than before and during the pandemic. Therefore, in general, the lessons learned during COVID-19 influenced the instructor to better prepare for post-COVID teaching. The undergraduate students observed a higher dedication and interest (Q1–5) in the instructor during post-COVID teaching; however, the postgraduate students did not indicate a significant change. The effectiveness of the instructor (Q6–7) improved for undergraduate students; however, the postgraduate students indicated a decrease in instructor effectiveness during COVID-19 compared to pre-COVID. Encouragement (Q8–9), assessment quality (Q10–12), and delivery (Q13) by the instructor decreased in an increasing order for postgraduate students, whereas they increased in an increasing order for undergraduate students during the pandemic. The postgraduate students were likely more mature than the undergraduate students. Most postgraduate students were employees, and they enrolled in the program to support their carrier development. Open-ended feedback noted that online learning was not effective for them because it did not improve their presentation and communication skills. They highly regarded that in-person discussions were the best for their learning. This may be true because most of the postgraduate students were not engineers, and they had issues with some engineering concepts that could be more easily understood with face-to-face learning and hands-on experience. Contrary to the postgraduates' responses, the undergraduate students appreciated the encouragement (Q8–9), assessment quality (Q10–11–12), and delivery (Q13) by the instructor during COVID-19 compared to pre-COVID. The open-ended feedback noted that the recorded online lectures were especially helpful because the students could refer to the recordings when needed. Undergraduate students appreciated the usefulness of the voice-over recorded lectures during the post-COVID period, which were perceived as much better than the online recorded lectures in terms of clarity; however, postgraduate students did not consider this to be an effective model of delivery. There was an anomaly in the mean data for Q8, Q9, and Q13 of instructor evaluation by undergraduate students for pre-COVID (Fig. 1a). They scored significantly low means compared to the other questions. Open-ended feedback confirmed that most of undergraduate students considered this course as a hard course. Because it includes mathematical

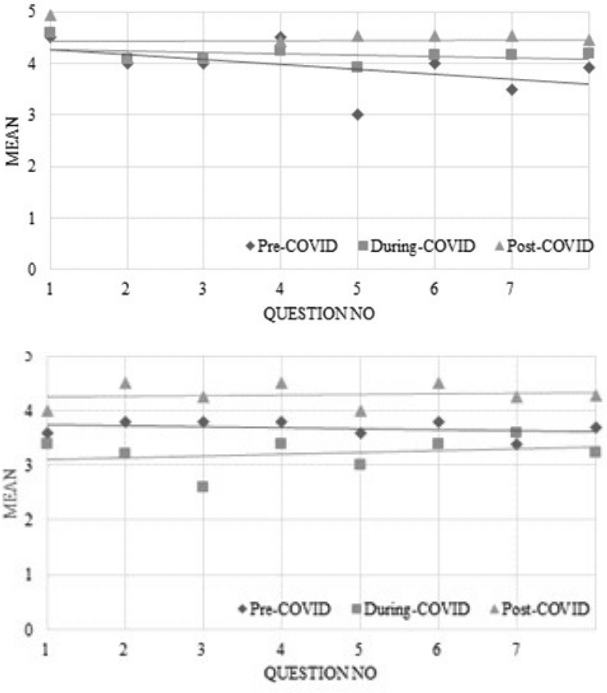

Fig. 2: Course evaluations; (a) undergraduate course, (b) postgraduate course. The last data point in each graph is the mean of all responses.

concepts and the students have been brainwashed into believing the course is difficult by senior students. Therefore, students' interest in the course was low at the beginning and negatively responded to these questions. However, this trend was not apparent during COVID and post-COVID as the student-student interaction was restricted and revised lecture notes with additional tools (voice-over recordings, solved examples, and supplementary notes on mathematics), respectively.

Fig. 2 shows the student evaluations of the undergraduate and postgraduate courses for the pre-, during, and post-COVID periods. Both the undergraduate and postgraduate students were more satisfied with the course in the post-COVID period than before or during the pandemic. The undergraduate students rated course content, knowledge, and quality (Q4–7) higher during the COVID-19 period than before this time. Open-ended feedback noted that video demonstrations and an excess of examples improved the quality of the lecture notes. However, for workload and activities (Q2–3), the undergraduate students' ratings were the same before and during COVID-19. The postgraduate students did not indicate progress of the instructor from pre- to post-COVID (Fig. 1b), but they observed a remarkable development in the lecture notes when taking the course after the pandemic. Open-ended feedback noted that the added examples during COVID-19 helped them to better understand the course during the post-COVID period. However, the postgraduate students who took the course during COVID-19 did not rate the lecture materials higher compared to pre- and post-COVID. Open-ended feedback revealed that online learning alone is not ideal for engineering postgraduate courses where most of the attendees are not engineers. Bashir et al. (2021) confirmed with the results from a survey conducted on Biosciences courses that COVID-19 created opportunities for a hybrid teaching, learning, and assessment approach for the future. The evaluated instructor in this study had eight-year experience in teaching in civil engineering Fluid Mechanics. However, it is worth to state that novice instructors who had incomplete student teaching experience may need additional support and self-efficacy during COVID for a successful carrier start at post-COVID (VanLone et al., 2022). Our study showed the evaluations only for a year after COVID. Kumar et al. (2021) stressed that although the online format has been included in the curriculum after COVID, the long-term consequence of which is yet to be recognized. Although online teaching is an essential part of teaching preparedness in the pandemic but the audience and course discipline determine the effective pedagogical methods with or without the use of online technologies (Rapanta et al., 2020). Our study confirmed that online learning alone is not ideal for engineering postgraduate courses where most of the attendees are not engineers.

6. Limitations And Assumptions

The sample sizes and response rates were low. These two factors were out of our control. Enrollment in the program depends on students' interests and market needs. The students were not forced or pushed to respond to the questionnaire. Toward the end of the semester, the students were focused on their final examinations; therefore, they paid little attention to end-of-course evaluations. Although it was not guaranteed, a fair assessment of the instructor and course was expected from the students.

7. Conclusions

Lessons learned during COVID-19 had remarkable effects on the higher education industry. They also created a practical opportunity for instructors and students to testify to the effectiveness of online learning in a stressful environment. Moreover, the online learning experience during the pandemic created a passion to adopt online resources along with face-to-face learning for better preparation and delivery of the course by the instructor during the post-COVID period. This study evidenced that both postgraduate and undergraduate students rated the instructor and course as being of higher quality during the post-COVID period compared to before the pandemic. This means that the effective use of both face-to-face and online techniques created a better environment for learners regardless of their academic level. Our findings also suggest that the undergraduate students observed a continuous development of the instructor and course in the transition period from pre- to post-COVID with the adaptation of online resources. However, only online learning led to low satisfaction among the postgraduate students during the pandemic.

8. Ethics Statement

This study was reviewed and approved by the university research ethics committee. The participants agreed to publish their responses in a journal format.

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