

An Insight into Students' Feedback on Synchronous Distance Learning During COVID-19 Lockdown

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Abstract

The fast growth of technology and internet in the last decade has built the necessary infrastructure for distance learning, and made the rapid transition to online teaching possible during the COVID-19 pandemic. However, there are still a lot of uncertainties about the impact of distance learning on students' learning effectiveness in engineering education. This paper presents the survey results about distance learning in a Civil Engineering course during the COVID-19 lockdown period and is aimed at understanding students' challenges and preferences in distance learning. The survey results reflect the students' perspective on online learning and provide an insight into students' feedback on the quick online transition due to the campus closure. The students' challenges in synchronous distance learning are identified and the strategies to improve distance learning effectiveness are proposed according to the survey results. A follow-up study was conducted in the Fall 2020 to address one of the students' challenges related to teamwork and peer collaboration in a group project. The survey results were analyzed and discussed to provide recommendations to improve students' learning effectiveness in distance learning during the current COVID-19 pandemic as well as for many years to come.

Introduction

When most college students left campuses for the spring break in mid-March 2020, few expected the COVID-19 outbreak in the United States. After the national emergency of the COVID-19 pandemic was declared, universities in the United States took drastic measures to close campus and use the spring break week for preparing and switching teaching online. The fast growth of technology has laid the ground for online teaching [1] [7]. However, there are still a lot of uncertainties about the impact of distance learning on students' learning effectiveness [6], and the forced online teaching and learning during the Covid-19 pandemic is one of those emerging topics [4] [5]. Given the narrow time window for this transition, Rochester Institute of Technology (RIT) provides the instructors with three alternative approaches to deliver the course materials online to complete the spring semester and award credits to students who meet the course requirements. RIT has adopted myCourses, an interactive and web-based course management system allowing instructors and students to access course materials since 2000s, as shown in Figure 1. Taking the advantages of the existing online platform, the three alternative approaches were: asynchronous document-type class notes and assignments posted on myCourses shell; asynchronous pre-recorded video lectures posted on myCourses with online discussion and messaging; and synchronous live streaming lectures using the Zoom meeting link built in myCourses. Instructors can combine the asynchronous options with the flip classroom approach, and use the online lecture time to answer students' questions through Zoom. For the course CVET-437 Principles of Dynamics in Civil Engineering at RIT, feedback from the students during the spring break showed they preferred the synchronous live streaming lectures more than the asynchronous modes. As a result, CVET-437 were delivered through the synchronous Zoom video conference for six weeks to complete the spring semester classes, and the exams were held remotely through the online platform myCourses. At the end of the semester, surveys were performed to collect students' feedback about their experience in

distance learning during the COVID-19 lockdown period in order to better understand the students' learning experience and challenges.

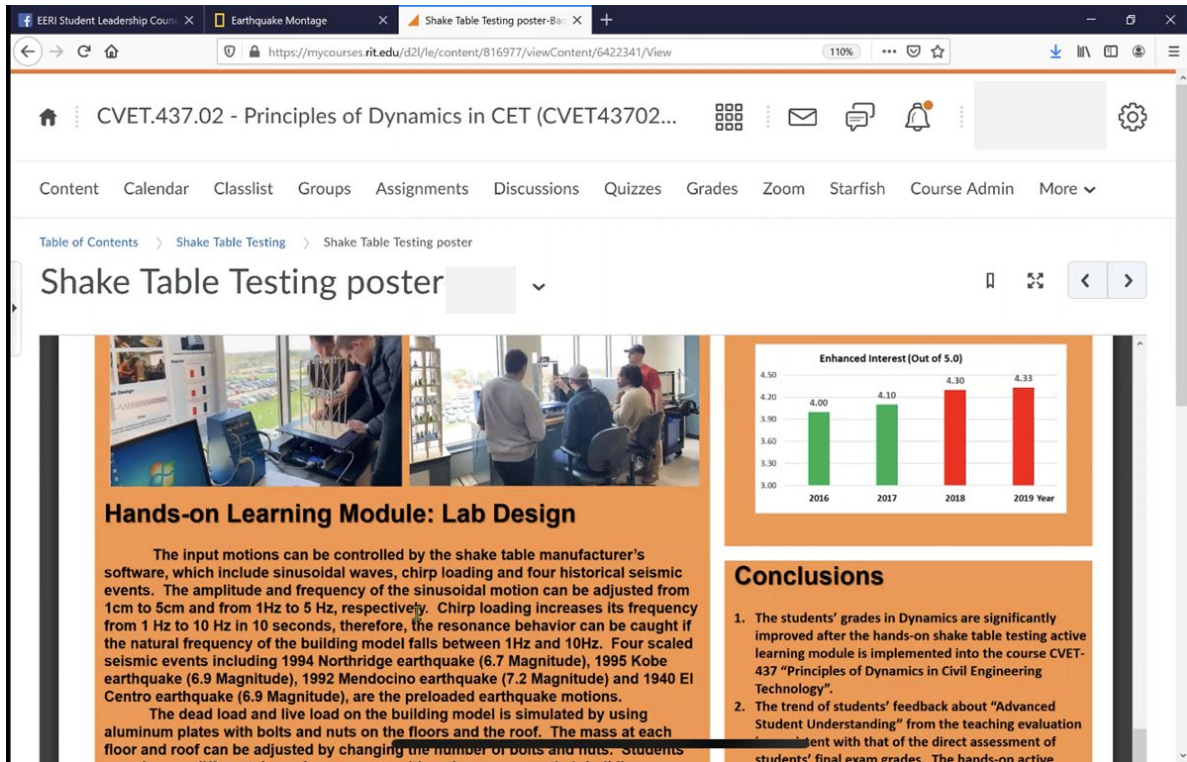


Figure 1: MyCourses Course Shell

Methods

The course of CVET-437 Principles of Dynamics is typically taken by the fourth- or fifth-year Civil Engineering Technology students at RIT and involves kinematics and kinetics as well as vibration of structures [3]. The total course enrollment number in spring 2020 was 57. The course was delivered through traditional in-class lectures for eight weeks before the spring break and through synchronous Zoom meetings for six weeks after the spring break. The Zoom meetings were held at the same time as the in-class lectures published on the university course schedule. A tablet computer with a tablet pen was used for synchronous online teaching, and the instructor's computer screen showing the real-time instruction materials was shared throughout the Zoom video lectures, as shown in Figure 2. The live streaming lectures were recorded and saved as .mp4 files. The recorded lectures and class notes markups were posted on myCourses for students' reference after each class.

Two surveys were sent to the students at the end of the 2020 spring semester to collect feedback about their experience in distance learning for the course CVET-437 due to the COVID-19 campus closure. The first survey had three voluntary questions written on the first page of the CVET-437 final exam, and the second survey had three questions related to the online teaching

transition on RIT's teaching evaluation portal. The students were encouraged to complete both surveys.

The screenshot shows a lecture slide titled "Week 14 beam vibration example-markup.pdf" with several handwritten annotations in red and green. The slide text is as follows:

Figure 1 shows a simple span concrete beam. The span length of the beam is 25 ft. The total dead load on the beam is 25 kip. The elastic modulus of the beam $E = 4000$ ksi and the moment of inertia of the beam $I = 15000$ in⁴. The damping ratio of the beam is $\frac{c}{c_c} = 5\%$. The periodic live load on the center span of the beam $F = 50 \sin(10t)$ kip.

Handwritten annotations include: $c = 5\% \times c_c$, $F = 50 \sin(10t)$ kip, $F_0 = 50,000$ lb, $\omega_0 = 10$ rad/s, and "lb".

The diagram shows a beam of length 25 ft with a central load of 12.5 ft. To the right, an SDOF model is shown with a mass $M = 776.4$ slug, a spring $K = 128,000$ lb/ft, and a damper $C = 3152$ lb·s/ft. The external force is $F = 50,000 \times \sin(10t)$ lb. The equilibrium position is marked with y .

Below the diagram is a list of 8 questions:

- 1) Natural frequency " ω_n ".
- 2) Natural period "T".
- 3) Critical damping coefficient " c_c ".
- 4) Damping "c".
- 5) The differential equation of vibration. (Damped forced vibration)
- 6) The displacement of the steady-state vibration, i.e. " x_p ".
- 7) The amplitude of the velocity of the steady-state vibration.
- 8) The amplitude of the acceleration of the steady-state vibration.

Additional handwritten notes at the bottom include $25 \text{ kip} \times 1000 \text{ lb/kip}$.

Figure 2: Synchronous Online Lecture Shared Computer Screen

Results

Survey No. 1: The purpose of the first survey is to figure out the students' challenges in the rapid transition to distance learning and try to understand how students feel about the learning outcomes during the COVID-19 campus closure. There are 3 questions in the survey No. 1.

Question #1: Which of the following approaches help you learn the most during the distance learning period for the course CVET-437?

Question #1 was designed to understand students' learning style and routine during the COVID-19 lockdown period. All 57 students answered Question #1, and some students selected more than one choice. The total number of replies was 83 for this question. The survey results of Question #1 are listed in Table 1.

Question #1 results show that students relied more on the follow-up materials than on the live streamed lecture only in the online learning environment. This finding indicates the importance

of making the follow-up materials accessible after the online lecture. The document-type follow-up materials supplement the synchronous lectures well, and are preferred by the students.

Table 1: Choices and Results of Question #1 on Survey No.1

Choices	# of Replies	% of the Total #of Students	% of the Total # of Replies	Top 2 Picks
A) Synchronous online lectures through Zoom	16	28.1%	19.3%	
B) The class notes, examples and homework solutions posted on myCourses	23	40.4%	27.7%	Yes
C) Online lecture notes markups and class example markups posted on myCourses	31	54.4%	37.3%	Yes
D) The recorded Zoom lecture videos posted on myCourses	11	19.3%	13.3%	
E) Textbook	2	3.5%	2.4%	

Question #2: Based on your confidence in the intended learning outcomes listed in the syllabus for the course CVET-437, which of the following best describes the learning effectiveness of the online teaching approach?

Question #2 was designed to collect students' feedback about course learning outcomes using the full online learning approach. There were 56 out of 57 students who answered Question #2, and Question #2 was a single choice question. Therefore, the total number of replies was 56 for this question. The survey results of Question #2 are listed in Table 2.

Table 2: Choices and Results of Question #2 on Survey No.1

Choices	# of Replies	% of the Total #of Students	% of the Total # of Replies	Top 2 Picks
A) As effective as the in-class lectures	12	21.4%	21.4%	Yes
B) Similar to, but not as effective as the in-class lectures	31	55.4%	55.4%	Yes
C) Significantly less effective than the in-class lectures	10	17.9%	17.9%	
D) More effective than the in-class lectures	1	1.8%	1.8%	
E) Not sure	2	3.6%	3.6%	

The results of Question #2 show that the majority of the students thought the online learning was comparable to the in-person lectures for this course. The instructor has experienced in developing web-based learning materials since 2012 [2].

Question #3: What is the biggest obstacle to the distance learning for the course CVET-437?

Question #3 was aimed at identifying the major challenges in distance learning during the rapid online transition. Table 3 lists the survey results of Question #3. All 57 students answered Question #3, and some students selected more than one choice. The total number of replies was 73 for this question.

Table 3: Choices and Results of Question #3 on Survey No.1

Choices	# of Replies	% of the Total #of Students	% of the Total # of Replies	Top 2 Picks
A) Hardware issues: such as computer, printer, and etc.	21	36.8%	28.8%	Yes
B) Internet issues	10	17.5%	13.7%	
C) Communication with the instructor	8	14.0%	11.0%	
D) Lack of peer collaboration	21	36.8%	28.8%	Yes
E) Distractions at home and hard to stay focused	2	3.5%	2.7%	
F) None	11	19.3%	15.1%	

The feedback from Question #3 showed that at the beginning of the pandemic, students were not well prepared for the sudden campus closure, and were not well equipped with the hardware necessary for online learning either. Peer collaboration was another major obstacle to online learning during the COVID-19 lockdown period.

Survey No. 2: The second survey was a university wide survey posted on RIT’s internal teaching evaluation portal at the end of the semester to collect feedback from students on their learning experience in each course. Multiple emails with the teaching evaluation website link were sent to the students to remind and encourage them to take the survey. The purpose of the survey is to provide the instructor with information to improve future teaching. Three questions related to distance learning during the COVID-19 lockdown period were added to the existing standard teaching evaluation rubric adopted by RIT.

There were 31 out of 57 students who took the second survey for the course CVET-437 on RIT’s teaching evaluation website. All three questions related to distance learning were single choice questions and the survey was anonymous. The survey questions and results are listed in Table 4.

The results from Survey No. 2 were consistent with the findings in Survey No.1. The majority of students agreed that the online learning was comparable to the in-person lectures for this course. Communication with the instructor was considered easy and was not identified as an issue in the online learning period.

Table 4: Questions and Results of Survey No.2

Survey Question	% of the Total Number of Replies				
1. Online Transition: Learned to similar degree since transition to remote	Strongly Disagree	Disagree	Unsure	Agree	Strongly Agree
	6.5%	3.2%	6.5%	32.3%	51.6%
2. Online Transition: Time spent compared to traditional class	Much Less	Less	Same	More	Much More
	3.2%	6.5%	71.0%	19.3%	0%
3. Online Transition: How easy to communicate with instructor since switch to remote	Very Difficult	Difficult	Unsure	Easy	Very Easy
	3.2%	0%	22.6%	32.3%	41.9%

Discussion

The unexpected COVID-19 pandemic pushed higher education to quickly switch to online teaching in the middle of the spring semester of 2020 in the United States. Understanding the students' challenges in distance learning are important for instructors to improve online teaching effectiveness, not only for the current pandemic but also for the years to come. In this paper, the summarized survey results showed synchronous online teaching can be as effective as traditional in-class lectures if the course is well designed and implemented. Access to the follow-up course materials including class notes markups and class example solutions in addition to the live streaming video lectures are very important to enhance students' learning effectiveness. While communication with instructor was considered easy, lacking peer collaboration was identified as one of the biggest obstacles to distance learning during the COVID-19 lockdown. For the courses involving group projects and group discussions, it is beneficial to encourage remote teamwork by organizing regular team video conferences, setting up task milestones and checking the team's progress frequently to engage participation and improve students' learning effectiveness.

Follow-up study

In the Fall semester of 2020, RIT was open to in-person classes with the combination of online and blended course modalities. CVET-431 Structural Steel Design was a course that was taught in-person in an auditorium and was live streamed through Zoom for students who needed to access the lectures remotely due to the COVID-19 related issues. A group design project was assigned at the beginning of the semester, and accounted for 30% towards the final grade of the course. The design project was carried out in a team of 4 to 5 students, and the students were encouraged to form their own group. The scope of the design project was to design a 4-story steel-framed office building, provide detailed design calculations, produce the final construction plan and make an oral presentation at the end of the semester. Teamwork and peer collaboration were essential to complete the design project. In the Fall 2020, except the in-person lectures, all office hours and team meetings were moved to the remote modes, such as Zoom, email, video call, online group chat, and etc., which made the teamwork less convenient. The instructor held

weekly Zoom video conferences with each design group to check work progress and answer any questions related to the design project. At the end of semester, a survey was sent to the students to collect feedback about the teamwork experience during the pandemic time.

In the survey, there were 2 questions related to the group design project. There were 40 students enrolled in CVET-431 in the Fall 2020, 32 out of the 40 students answered the questions in the survey, and the remaining 8 students did not return the survey. Therefore, the total number of students replied was 32. The choices and replies for the 2 survey questions were listed in Table 5 and Table 6, respectively.

Question #1: For the CVET-431 Steel Design project, which is the most challenging factor in the Fall 2020?

Table 5: Choices and Results of Question #1 on CVET-431 Design Project Survey

Choices	# of Replies	% of the Total # of Students Replied	Top 2 Picks
A) Communications with group members	9	28.1%	
B) Technical knowledge related to steel design	7	21.9%	
C) Peer collaboration and teamwork	10	31.3%	Yes
D) Communications with the instructor	0	0.0%	
E) Technology issues, such as computer, printer, internet, and software	6	18.8%	
F) Time commitment	10	31.3%	Yes
G) Distractions due to the pandemic	13	40.6%	Yes
H) None	3	9.4%	

In the follow-up study, pandemic distractions moved to the top of the list of learning challenges, and peer collaboration and teamwork still remained as one of the most challenging factors.

Question #2: What technology did you use for the design project group communications in the Fall 2020?

Table 6: Choices and Results of Question #2 on CVET-431 Design Project Survey

Choices	# of Replies	% of the Total # of Students Replied	Top 2 Picks
A) Email	8	25.0%	
B) Text message	17	53.1%	Yes
C) GroupMe	8	25.0%	
D) Slack	4	12.5%	
E) Zoom	16	50.0%	Yes
F) Other. Please specify:	6	18.8%	

For the selection of “F) Other” in Question #2, Snapchat, Google drive and Google doc were mentioned in the students’ replies.

Cell phones are the most popular devices used for group communications in teamwork. Text message is identified by the students as the most convenient approach for communication in group project.

Conclusions

The rapid transition to online learning during the COVID-19 lockdown triggered a boost of technology adoption among higher education instructors. The live streaming lecture has been considered the most favorable option for distance learning during the pandemic time. Students’ feedback about their experience in synchronous distance learning is important for the instructors to identify the students’ challenges and preferences and further improve teaching and learning effectiveness. From this study, we can draw the following conclusions after analyzing the survey results:

- 1) The learning effectiveness of synchronous online teaching depends on many factors, including but not limited to instructor’s course preparation for online teaching, technology, internet, clear communications, students’ focus and distractions in the non-traditional learning environment.
- 2) Making the follow-up course materials accessible after the live streaming video lectures, such as class notes markups, class example solutions and recorded lecture videos are very important to enhance students’ learning effectiveness in synchronous distance learning environment.
- 3) Peer collaboration is identified as one of the biggest obstacles to distance learning, especially for the courses consisting of semester-long group projects. To encourage teamwork and peer collaboration, the instructors can set up regular group meetings with students to answer questions, check working progress and identify students’ difficulties and provide solutions.
- 4) Cell phones are the main communication devices for students in distance learning environment. While there are many emerging smartphone applications with the function of group chat, text message is currently still the most popular method adopted by the students for teamwork communications in online learning during the COVID-19 pandemic.

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