The COVID-19 Pandemic: The Hallmarks of Online and Hybrid Teaching in the Engineering Classroom

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Abstract

The coronavirus disease has caused a worldwide pandemic impacting higher education. Scientists are gaining an understanding that the virus has a propensity to travel via a person's respiratory droplets and is more likely to spread when people are nearby. As a result, the U.S. government issued a stay-at-home order during the spring semester of 2020. The institution was one of the few schools that reopened its doors for the 2020-2021 calendar year. The shutdown and reopening drastically altered course pedagogies as the traditional seated classrooms morphed into online and hybrid or blended courses. The problem was that the transition did not align with the original instructional design. The instructional strategy became uncoupled and was no longer compatible with the learning objectives and student outcomes. A personal experience narrative was performed to describe the nature of the teaching experience as the pandemic intervened in the classroom. This paper provides the hallmarks of best practices and lessons learned when implementing online education into the structural engineering courses at a small, Midwestern liberal arts, private institution.

Introduction

The governmental stay-at-home orders abruptly intervened into higher education in March 2020 due to the COVID-19 pandemic [1] and subsequently altered the original course design. Faculty spend a considerable amount of time developing their courses, which are uniquely suited for the in-person, seated, learning experience. We may coordinate our courses using an instructional design model such as the ADDIE (Analysis, Design, Development, Implementation, and Evaluation) [2]. The ADDIE and other instructional systems design methods align the learning objectives, instruction, student outcomes, and assessment techniques. A problem arises when the original instructional design method is no longer applicable. The governmental and institutional reactions created a sea change effect for courses originally designed for in-person learning.

In response to the shifting instructional design, the author explored the question, "What is the nature of the COVID-19 pandemic intervening in the engineering courses from a teacher's perspective?" To examine this condition, a personal experience narrative was performed to describe the journey of being a faculty member at a private institution teaching immediately prior to the pandemic, during the shutdown, and during the pandemic. The primary purpose was to explore the nature of the pandemic intervening in the engineering classrooms. This paper addresses persons interested in education, engineering, architecture, the COVID-19 pandemic, online learning, and hybrid or blended classrooms. The introduction includes the background information for the pandemic, the broad institutional response, and online education.

The COVID-19 Pandemic

The World Health Organization identified the COVID-19 virus as a public health emergency of international concern on January 30, 2020 [3] and declared the infectious disease a pandemic on March 11, 2020 [4], as it spread worldwide. COVID-19 was initially categorized as having a

zoonotic basis where the pathogen is transferrable from an animal host such as a bat to a human [5]. The US exceeded 500,000 fatalities in January 2021 due to COVID-19 [6]. COVID-19 became the third leading cause of death behind heart disease and cancer for individuals between the ages of 45 and 84 [7]. The average age of faculty falls within the 45 to 84 range.

The virus is particularly perilous due to its airborne transmission between people who may not know if or when they become infected. The virus is transmitted person-to-person through the inhalation of airborne droplets and their subsequent aerosolized particles [8]. One form of transmission requires breathing shared air between infected and non-infected people. Therefore, the proximity in enclosed spaces might be problematic. Every infected person begins as asymptomatic then some progress to presymptomatic and symptomatic stages while 20-31% may remain as asymptomatic throughout [9]. Significant amount of virus shedding occurs in the upper respiratory tract [10] for the asymptomatic and presymptomatic persons. People can transmit the virus without developing symptoms or feeling sick and would be unaware that they might spread the virus while in the presence of others.

Institutes of higher education have situations where the students gather in large groups in confined classroom settings with older and potentially at-risk faculty. Younger individuals are more likely to be asymptomatic than older individuals [9]. The pandemic has placed higher education in an unusual position where an asymptomatic and presymptomatic student body could be inadvertently transmitting the virus. The median age of tenure-track faculty is 49 [11] and within the negative COVID-19 outcomes age range [7]. Drury University abided by the stay-at-home order and did not reopen the physical classrooms after spring break in 2020. The school reopened its doors the following fall under strict physical distancing, masking, and other quarantine guidelines.

Institutional Response

Drury University followed the governmental stay-at-home order in spring 2020. The stay-at-home order aligned with the institution's spring break that was extended for one week. The extra week facilitated the student exodus and the online transition. The school permitted the students to gather their belongings from the dorms and materials from the design studios before returning home. As the University shifted from the seated classroom to the online model, the school created faculty accounts for the Zoom video conferencing platform. The accounts allowed for extended sessions and recording times. The school already had a Moodle learning management system (LMS) available for every course and offered additional technical support.

The University adhered to the country's reopening recommendations for the 2020-2021 calendar year. "According to the Chronicle of Higher Education's reopening tracker [12], Drury is one of *just 2 percent* of the country's nearly 3,000 colleges holding fully in-person classes" [13]. Drury made several significant changes impacting the schedule, classroom accommodations, and Covid-19 tracking. (1) To discourage travel during the semester, Drury adjusted the academic calendar to shorten the fall, spring, and Thanksgiving breaks [14]. (2) The University removed desks from the classrooms to ensure a minimum of 6+ ft physical distancing. (3) The students and faculty wore masks in the classrooms and cleaned their areas to minimize the spread of the virus. (4) The University provided a camera on a tripod, portable microphone, video

conferencing platform, and a LMS for students unable to attend in-person classes. (5) Drury randomly selected 20 percent of the students for testing each week and 20 percent of the faculty and staff for testing every two weeks. The testing identified asymptomatic and presymptomatic persons. The infected then entered the quarantine protocols. (6) The University provided an online dashboard that tracked the total number of confirmed cases [15].

Online Education

Scholarship reveals that the success of online courses parallels the breadth and depth of student and instructor engagements. A greater reliance upon online instruction requires a commensurate increase in collaborative interaction. Palloff and Pratt recognize that an effective online model, "includes deliberate attempts to build community as a means of promoting collaborative learning" [16]. Collaborative learning promotes a social presence and promotes independent learning. "The instructor in an online class is responsible for facilitating and making room for the personal and social aspects of an online community so social presence can emerge and make the class a successful learning experience" [16].

Teachers can apply several techniques to build community. The online activities are more effective when treated as collaborative information seeking behaviors and reflective adventures as opposed to directly teaching the students [17], [18]. One example of an information seeking behavior could be a simple unassessed icebreaker activity at the beginning of a course where the students to share information about themselves while gathering information from their peers [19]. A second example is discussion boards. These are assessed collaborative activities where each student posts an answer to a specific question and is required to respond to other students' answers. The class discussion boards can flourish without the instructor's guiding dialogue as the students engage in asynchronous threads [20], [21]. The keys are to include shared responsibility, require constructive feedback, and inspire expansive questioning. A third example is a self-reflection activity which encourages independent learning thereby becoming transformative [22]. A third example is team contracts that may offer a level of accountability leading to learner satisfaction with group projects [23].

Procedure

A narrative research design with a qualitative sensibility was selected to describe the personal experiences associated with the COVID-19 pandemic intervening in the classroom. The rationale is that a narrative study affords an opportunity to tell the story through teacher reflection [24]. The story is a first-person, autobiographical account [25] with prompting from archived course documents. The classroom setting is a private institution with architecture students taking structural engineering courses.

The narrative context is twofold as it describes a bounded timeframe and scope, and then narrows to experiences in and out of the classroom. First, the personal experience story may include various broad occurrences intimate to the issue that might be outside of the classroom [26]. Second, the teacher's story can be narrowed to address activities inside the classroom [27]. The narrative was assigned codes where the redundant and noteworthy codes were elicited and condensed into themes [28].

Teaching Experiences Surrounding the Pandemic

The teaching experiences is an excerpted, edited, and cited version of a life story about the challenges of teaching around the stay-at-home order and during the pandemic. The setting is Drury University, a small Midwestern private institution rooted in the liberal arts tradition. The architectural structures sequence is housed in the National Architectural Accrediting Board (NAAB) accredited five-year professional program. The experiences include the pre-pandemic, stay-at-home, and pandemic periods.

The Pre-Pandemic Period

The pre-pandemic section includes the pedagogical models for the courses and the ascent of COVID-19. The traditional seated courses subsection includes the learning objectives, instruments and assessment methods, instructional methods, course materials and distribution techniques, and the classroom environments. The COVID-19 subsection highlights the status of the virus nationally and locally from January 2020 until March 2020.

The Traditional Seated Courses   I used a backward design pedagogical model where I identified the desired results first, determined the acceptable evidence second, prior to planning the learning experiences and the associated instruction [29]. The learning objectives were very prescriptive and close-ended in the introductory classes and contracted into fewer and more open-ended objectives in the capstone course. The introductory classes had upwards of 50 objectives each. The objectives involved gravity and lateral forces, structural framing and stabilization, rigid body statics and deformable body mechanics, and beam and column behavior and design. The desired level of learning was possessing an understanding of the technical theory. The capstone course had eleven primary objectives where each objective was a mini-project. The objectives built toward a comprehensive design that was a code compliant, graphical and numerical structural solution to a predetermined architectural design. The desired level of learning was demonstrating the ability to apply the technical theory to a large complex problem.

The instruments were in the form of homework problems and examinations for the introductory classes, and mini-projects assembling into a comprehensive solution for the capstone course. Each homework and examination question connected to a single learning objective. The questions were in the same format as the National Council of Architectural Registration Board (NCARB) license examination. I have been building question banks into the Moodle leaning management system (LMS) for the past couple of years. The homeworks and exams extracted questions from the bank. The capstone project was the schematic structural engineering solution to a given architectural design of a 16,000-ft^2 archeology center. The building featured two-story spaces, long span systems, cantilevered roofs, irregular spaces, skylights, and intentional design conflicts between engineering and architecture-driven preferences. The students negotiated through design choices from the perspective of being an engineer while designing a code compliant, structural steel, braced building that responded to gravity and lateral forces.

I applied an adjusted-percentage method in an absolute grading system for the introductory courses, and a distribution-gap method in a relative grading system in the capstone course. Since I provided a detailed set of learning objectives, it was possible to establish an expected level of

knowledge. Student achievement was measured relative to a fixed standard. The adjusted percentage recognized imperfections of an exam difficulty, instructional deficiencies, etc. The benefit to this strategy was that the students have a greater opportunity to earn higher grades commensurate with their effort. The notion was that the course grade reflected achievement with the course goals rather than performance measured against a reference group associated with relative grading systems [30]. In the introductory courses, the Moodle LMS automatically scored the homework and examination questions. For the studio-based capstone course, the student projects had visualizations possessing qualitative attributes and did not have numerical scaling. Instead, I used a letter scaling that adapted the university language to my standards.

I used lecture and studio for the instructional methods. In the introductory courses, I deployed an instructor-centered (teacher-directed) lecture methodology in the classroom [31]. The lecture model represented the traditional delivery of factual knowledge and the fundamental principles for understanding technical theory. The content was primarily disseminated through the whiteboard with occasional PowerPoints, media clips, and videos. The whiteboard balanced the pace of instruction and the student engagement. The structures capstone was in a studio format to replicate the professional industry experience. The studio was variant of the laboratory classroom [32]. The studio instruction facilitated the classroom application of the smaller individual structural engineering problems combining into a comprehensive solution. All the students were working in the classroom while I met with smaller groups and individuals.

The course materials for the introductory courses supported each learning objective. The materials included written narratives, video summaries, and handwritten lecture notes. Nomenclature and formula sheets and practice problems and solutions supported the objectives with numerical outcomes. The course materials for the capstone class included an American Institute of Architects consulting agreement with attached exhibits (prime agreement, architectural program, and the architectural solution) and a sample solution for a comparable building. The course materials were shared through the Moodle LMS. At the end of the courses, the student received a final comprehensive PDF coursepack of the materials.

The introductory lecture courses were commonly taught in a classroom and the capstone course was taught in a design studio. The classroom capacity was about 45 students with the typical class size either 18 or 36 depending on the number of sections. The floor plan proportion was approximately 1½:1 (width:depth). The room had one whiteboard of about twenty-feet in length. The room had a podium housing a computer desktop with internet and departmental server connections and one video projector with a projection screen. The room was recently updated to include dimmable lighting. The classroom had no distractions (e.g., no windows, no clock, no pencil sharpener, etc.). The studio capacity was about 36, which varied annually based on the desk configurations. The studios had a great-room ambiance with an abundance of natural daylight. Each studio student had a drafting table and desk with a lockable cabinet.

The University required 8-10 office hours per week. The requirement had become relaxed in recent years as the faculty and students found creative new ways to virtually engage. I generally preferred to meet in-person out of convenience. My office was within 10 feet of the entire third-year student studio space. I taught the required courses and could easily meet with the students before and after their classes.

The Incoming COVID-19   The semester started normally, although there was a perceived weight of impending uncertainty that got heavier throughout the semester. The first U.S. case of COVID-19 was reported on January 19, 2020 [33], in Washington state from a gentleman who returned from Wuhan, China. Our university leadership issued a statement at the end of January about the public alerts issued by the Centers for Disease Control (CDC) and the U.S. Department of State (DOS). The institution reminded us about the importance of good hygiene and cough etiquette along with potential impacts to travel. The threat of the virus appeared imminent and simply a matter of time until it reached the smaller populations. The University created a dedicated webpage that included the latest coronavirus information.

March and April 2020 were the months that reached a point of intensity where local action was taken. On March 9, 2020, the university president issued guidelines and restricted travel. On the same date, the dean designated me as a technology resource to answer questions surrounding Moodle. On March 12, 2020, the university president informed the staff and faculty that the spring break will be extended by one week and classes will resume on March 30, 2020, "to join with ongoing national efforts to mitigate community spread of the coronavirus" [34]. The one hundredth U.S. death occurred on March 17, 2020 [35]. The first case of coronavirus was reported in our state on March 18, 2020 [36]. California was the first state to issue a stay-at-home order on March 19, 2020 [37].

The Stay-at-Home Order

The Springfield mayor issued a 30-day stay-at-home order under emergency authority that commenced on March 26, 2020 [38]. The order was to limit travel except for essential activities such as grocery and pharmacy shopping and to meet health care needs. The order commenced four days prior to the students' return to campus from spring break. Although the University did not permit the students to live on campus or attend classes, they allowed them to pick up their supplies from our building at designated times and under supervision. The order changed the courses from traditional seated classrooms to fully online courses.

Online Courses   Since no one had access to the classroom, the studio, or my office, the seated spaces became a virtual learning environment, and my kitchen area became an office. The Zoom video conferencing accounts permitted for extended live-streaming meeting times along with the capability to record and archive MP3 audio and MP4 video files. I did not have any technology at home and received permission to relocate my office computer to my residence. The changes from a traditional seated classroom to an online course created immediate changes to the methods of instruction from lecture and studio to online experiences.

The seated whiteboard lecture course became a synchronous live-streaming PowerPoint presentation, while the studio (lab) course became a synchronous group discussion course. I did not have a tablet to engage the students in a similar manner as the whiteboard. I replaced the whiteboard with new PowerPoint presentations. The pace of instruction was faster due to the lack of instructor writing and student replicating. Although, the pace offered more time for engagement, it compressed the time for the students to gestate the information. One challenge was that we were new to online courses and did not initially know all the Zoom interaction functions beyond the audio exchange.

The studio course used the existing course materials from the LMS to activate group discussions. I opened and described the course materials such as assignments, technical content, and sample designs. The students saw the documents with my face cam in the bottom corner. In addition, the students were able to screenshare their progress on the graphic solutions and supporting calculations. Zoom had an annotate feature where one can draw on top of the screenshare. Although the annotations were respectable replacements to the one-on-one instruction that the studio format provided, virtual roaming to answer questions was not comparable to roaming in the studio. Rather than having the entire class in one area, the groups met at designated times.

The attendance for the online classes were less than those for the seated classroom. The introductory classes included second- and third-year classes while the capstone course included the seniors. The hardships were many for the second-year students. The course included several international students where the class meeting times were in the middle of the night, and they chose to view the presentations asynchronously. Some students had to seek employment to pay rent since they were not living on campus. Other students simply became detached due to the new online experience. The smaller group discussions had greater attendance for the fourth-year students possibly due to the increased accountability of being noticed when absent.

I engaged the online students in unique ways to maintain their interest. (1) All courses included an initial icebreaker activity. A Fact or Fiction game was in an all-class discussion board. Each student identified at least four truths about themselves and one falsehood. The students would respond to their cohorts by attempting to guess their falsehoods. The threaded discussions helped build community particularly with the second-year students. (2) Small group discussion boards were created for the capstone studio course so the students could closely collaborate with their teammates. (3) Student likenesses were placed in the PowerPoint presentations to ask random questions of the instructor. (4) I let homelife intervene into the live-stream face cam. The nuances included children getting in camera view seeking attention, pet cats walking on the keyboard, or the barking dog in the background wanting to chase squirrels.

The working conditions for the students were generally not as good and as universal as those provided by the institution. The students did not have equitable studio workstations at their new locations. The quality of workstation was diminished in most cases by not having drafting tables or access to quality natural light. The degree of privacy was reduced as they moved in with family, friends, or strangers. The students were not surrounded by their peers working on a common goal was more prevalent in the online studio course than in the online lecture course.

The types of instruments did not change although the amount was adjusted. In the introductory course, we removed the comprehensive final and provided the students with more time to process information before the last content exam. The number of learning objectives assessed remained the same. The deficiency was that each objective was not reinforced through a final comprehensive assessment. In the capstone course, some of the subordinate objectives were reduced due to the lost week and the studio inadequacies. One lost objective was sizing the reinforcement in the column footings, but the students had determined the footing sizes. Instead, the students were given sample solutions.

The office hours locations and times changed from meeting in my office to answering questions either through e-mail or by conducting virtual meetings through Zoom. I had some formal Zoom hours where I remained signed into Zoom periodically. The students seemed to meet with me less during the stay-at-home timeframe.

COVID-19 Resources The University created a dedicated webpage that provided current information about the coronavirus. The webpage included information and links from national and local governmental agencies, in addition to its impact on the institution. The University received governmental letters that faculty were classified as essential personnel. Essential employees were permitted to travel between school and home to instruct classes from our offices, but the institution preferred that we stayed home [39]. During the stay-at-home order, the University announced that the classes were to be held on campus during the 2020-2021 calendar year [40]. Reopening required social distancing, smaller class sizes, sanitation efforts, among other yet to be determined creative classroom solutions.

The Pandemic Year

The University required that all courses be seated classrooms with live-streaming video conferencing, that all courses abide by social distancing guidelines, and that all people wear masks. The requirements shaped how teachers instruct, how faculty and students interact, and class sizes. The shift to a hybrid or blended class was less abrupt than the prior transition to online instruction. The summer afforded the faculty an opportunity to adapt the course pedagogies if the instruction did not align with the objectives and outcomes. The social distancing mandates impacted the number of students in the classrooms. If the instructor remained in the same classroom, they would have fewer students and more sections. If the instructor moved into a larger classroom, they might be able to maintain the original attendance.

Hybrid Courses I kept the backward design pedagogical model where I identified the desired results first, determined the acceptable evidence second, prior to planning the learning experiences and the associated instruction. The social distancing and sanitation constraints drove changes to the learning objectives. The purpose was to reduce the exchange of paper and make assessment comparable for seated and distance students. Therefore, the learning objectives remained prescriptive in the introductory classes while the capstone course objectives shifted to become more prescriptive. The course still had eleven primary objectives, but now included hundreds of specific subordinate objectives.

There were only minor changes to the assessment instruments and the grading method in the introductory classes, whereas the capstone course had changes to both. In the introductory class, the position of the fixed standard became more student-friendly in the adjusted-percentage method due to the uncertainty of the COVID-19 impacts. In the capstone course, the assessment instrument became a detailed rubric in Moodle. The Moodle rubric permitted the addition of unlimited subordinate learning objectives inside one mini-project recognized as an 'assignment'. Rubric grading required the manual assessment for each learning objective and automatically computed the total score. The grading method for the capstone shifted to the same method as the introductory course even though one used rubric and the other did not.

We returned to the pre-pandemic whiteboard lectures in the introductory courses. The seated students had some normalcy being in the same classroom except there were fewer seats, they wore masks and sanitized their areas, and there was a camera on a tripod. The course materials were the same. Teaching and learning with masks were a challenge as I relied heavily on the facial expressions to engage the students. Live-streaming lectures accommodated the overflow attendance, students in quarantine protocols, and the international students. The camera could not adequately capture the whiteboard writings. Therefore, the online students were viewing the screenshare of handwritten PDF lecture notes from Moodle while listening to my commentary. I wore a 20+ foot microphone and would periodically return to the podium and scroll through the PDF for the online students. Moodle contained the MP4 videos for asynchronous viewing.

The department designated the design studios as safe zones for the students. The faculty were discouraged from entering the studios and using the space for teaching. Instead, the school built several reservable communication stations with different levels of participants. Different size desks and tables with transparent barriers protected the users. The users could pass drawings and papers through a space under the barriers. The lecture classroom replaced the studio space. The room was too small to accommodate the entire studio class. The student teams met with the instructor in the classroom or via Zoom for designated weekly meetings. Students were permitted in the classroom if they needed additional assistance during their non-meeting times.

The department designated the faculty offices as safe zones for the faculty. The students could seek out the faculty during their office hours, but they would have to communicate in an unoccupied classroom or at a communications station. The traditional office hours were now responding to e-mails, video conferencing with students, or using the communications stations.

COVID-19 on Campus The University provided free random COVID-19 testing and online results tracking and supplied free hygiene products to clean work surfaces shared with others [41]. Drury randomly selected 20 percent of the students for rapid testing each week and 20 percent of the faculty, administrators, and staff for testing every two weeks. The testing identified asymptomatic and presymptomatic persons. The infected then entered the quarantine protocols. The tested and uninfected could return to class after receiving clearance. The testing windows occurred during my teaching days and times. Therefore, students were missing class either to be tested and wait or by testing positive. Students and faculty testing positive were quarantined to their residences and worked from home and communicated through Zoom and Moodle until receiving a negative test. The dedicated webpage was updated to include a coronavirus dashboard. The dashboard anonymously tracked the number of individuals tested and the results were categorized in terms of students, faculty, and staff, and whether they were on or off campus.

Findings

The teaching experience was analyzed by hand though a coding process [42] to elicit themes in the form of pandemic contextualization. *In vivo* codes such as pre-pandemic, stay-at-home order, and pandemic were stitched into pedagogy, classrooms, and students. Figure 1 highlights the generalizations extruded from the story. Community, social presence, and independent learning were the significant attributes from the pandemic intervening in the engineering classroom.

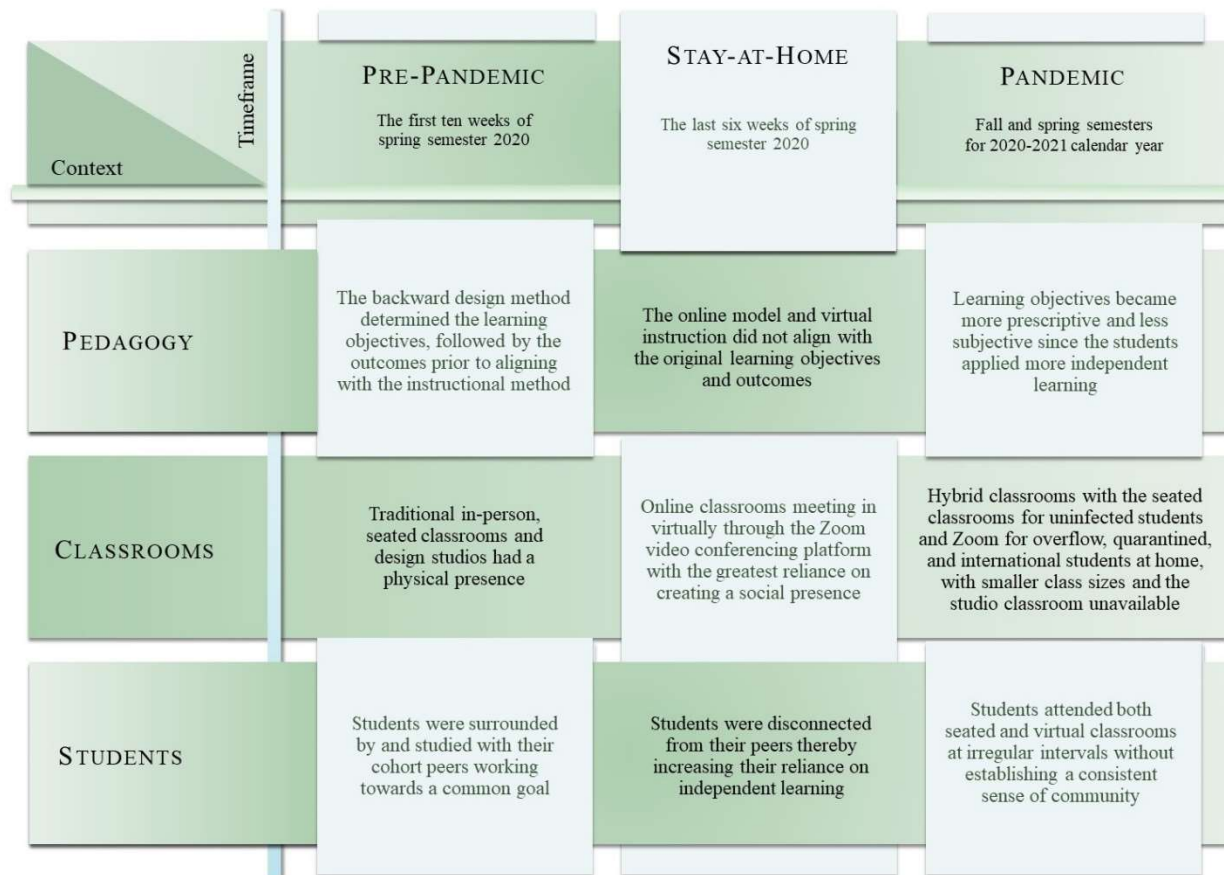|	PRE-PANDEMIC The first ten weeks of spring semester 2020	STAY-AT-HOME The last six weeks of spring semester 2020	PANDEMIC Fall and spring semesters for 2020-2021 calendar year
PEDAGOGY	The backward design method determined the learning objectives, followed by the outcomes prior to aligning with the instructional method	The online model and virtual instruction did not align with the original learning objectives and outcomes	Learning objectives became more prescriptive and less subjective since the students applied more independent learning
CLASSROOMS	Traditional in-person, seated classrooms and design studios had a physical presence	Online classrooms meeting in virtually through the Zoom video conferencing platform with the greatest reliance on creating a social presence	Hybrid classrooms with the seated classrooms for uninfected students and Zoom for overflow, quarantined, and international students at home, with smaller class sizes and the studio classroom unavailable
STUDENTS	Students were surrounded by and studied with their cohort peers working towards a common goal	Students were disconnected from their peers thereby increasing their reliance on independent learning	Students attended both seated and virtual classrooms at irregular intervals without establishing a consistent sense of community

(Context / Timeframe axis)

Figure 1. Basketweave contextualization of the pandemic intervening on education.

Discussion

The primary purpose was to explore the nature of the pandemic intervening in the engineering classrooms. The author explored the question, "What is the nature of the COVID-19 pandemic intervening in the engineering courses from a teacher's perspective?" To examine this question, a qualitative narrative study in the autobiographical tradition was conducted. The inquiry provided a chronological story that led to three hallmarks of best practices and lessons learned when confronted with the COVID-19 pandemic and teaching online.

Hallmarks of Best Practices and Lessons Learned

For an online community to thrive, the primary elements should be organized "into three groupings – *people, purpose, and process* – and believe that the outcome of a well-constructed community-oriented online course is *reflective/transformative learning*" [16]. Palloff and Pratt [16] further articulate in that: (1) people include interaction / communication and presence; (2) purpose includes mutually negotiated guidelines and practical considerations; and (3) process includes reflection – transformative learning and social – constructivist learning. These can be achieved by building a sense of community, establishing a social presence, and facilitating independent learning.

Community   The "Key to the learning process are [sic] the interactions among the students themselves, the interaction between the faculty and students, and collaboration in learning that results from these interactions" [16]. For students to become engaged in a course, the instructor should establish a variety of course activities with peers and the instructor that builds a sense of community.

- *Collaborative group activities should increase commensurately with the reliance on online communications*

  The notion is that an online class needs more group activities than a hybrid class, and a hybrid class needs more group activities than a seated in-person class. For example, collaborative activities in an online class could range from threaded discussion boards for the entire class or for smaller groups. Group projects are also important to build community.

- *Collaborations should have a decreasingly graduated scale of engagements*

  The idea is to sequence the activities from large to small where the entire learning community is engaged in the beginning before entering more isolating group and individual projects. For example, the course might begin with an ice breaker activity, proceed to class discussion board, group projects, and then conclude with individual projects and reflections.

- *Integrate team building activities*

  The premise is that the students are part of a cohort graduating class of peers that could act as a support network. A course might include specific activities that require team building. For example, team building exercises could occur at the class or group stages through gamifying activities such as bingo [43].

Social Presence   "There needs to be a focus on establishing human-to-human contact before the interaction" [16]. Palloff and Pratt are making a simple point that communication between the students does not necessarily indicate that the students have a sense of belonging or social presence in the class. The human-to-human contact in distance learning can be achieved by asynchronous and synchronous activities to promote a social presence.

- *Require video submittals for some assignments*

  The notion is to have the students see and hear the other students respond in an asynchronous manner. For example, the instructor might include an introductory assignment where the students some aspects of the course, expectations, prior knowledge, etc. then upload an MP4 video to the LMS. The students could then visualize their classmates during later threads.

- *Require synchronous activities between the students in group projects*

  The notion is to have live virtual interactions. For example, the students might be required to conduct team meetings through a video conferencing platform to discuss the delegation of work, progress, next steps, etc. before they begin a group project.

- *Allow life to intervene in the synchronous virtual classroom as in the traditional classroom*

  The premise is that the students engage socially in the traditional classroom and should be permitted to have a social presence in the online community. For example, the students were able to view my dining room and other areas of the house and interact with my children and pets. Letting the students observe the elements of real life encourages social exchanges.

  Independent Learning   In a traditional seated lecture classroom, the learning experience is teacher-centered whereas an online class is student-centered. Independent learning is critical since the teacher shifts to the role of a facilitator and the process becomes more learner-centered through the self-directed behaviors of the students [16]. Instructors should provide and organize content in a manner that facilitates independent learning.

- *Provide course materials that align with the learning objectives*

  The notion is to connect content to the objectives. For example, in using backward design, I created the learning objectives first and then built the question bank in Moodle. The objectives and the outcomes were the bookends, and then I developed the course materials accordingly.

- *Provide a variety of different online course content*

  When the online content aligns with a student's preferred information seeking behavior, they are more likely to become independent learners. For students to become immersed in their preferred medium, teachers should provide a variety of content formats such as textual (doc), visual (jpg), audio (mp3), and video (mp4) files.

- *Organize online content in a manner that keeps the students engaged*

  The premise is to not overload the students with an abundance of course materials or they may disengage. The LMS permits content to be organized based on the calendar or content. For example, one might choose organizing by week one, two, three, etc. activities or through portals such as syllabus, module 1, module 2, homework and exams, Zoom lectures, etc.

Concluding Thought

  "True teachers are those who use themselves as bridges over which they invite their students to cross; then, having facilitated their crossing, joyfully collapse, encouraging them to create their own." – Nikos Kazantzakis [44]

Greek writer Kazantzakis understood that the bridge whether physical or metaphorical can be an unknown journey that the teachers and students take as a leap of faith. In our case, we abruptly crossed a bridge from the comforts of the traditional seated classroom into the unknowns surrounding distance learning. For many of us, we may have some experience in virtual meetings, but very few faculty were prepared for shifting to online instruction for courses that may have taken years to develop.

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