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Personal Experiences from Teaching Virtually Online During the COVID-19 Pandemic

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Personal Experiences from Teaching Virtually Online During the COVID-19 Pandemic

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Abstract

The author shares personal experiences of his first full-time virtual course taught synchronous online due to COVID-19 conditions. The author attempts to enumerate advantages and disadvantages of virtual teaching in this mode versus in-person teaching of the same course. Literature search to support these personal experiences is performed. Lastly, student feedback via survey on such course is supplied providing statistical data on such course teaching modality that have been suddenly pervasive with the COVID-19 gripping the world scene. Even comparative course grades and course evaluations are supplied to compare any major up-tick or down-tick from the pre-COVID era. Based on the survey and grades/course evaluations comparisons, it is concluded that the shift to pure online teaching was successful.

Introduction:

Online learning has been going on since at least 1982 [1]. This educational delivery mode has only been strengthening and diversifying since (in terms of features, capabilities and content). Although the advent of the Internet allowed for free, and even immense, flow of information, more mature Internet use revolved around structured data and information presentation and delivery. Online or virtual teaching away from person-to-person was brought in force by the University of Phoenix [1].

Once online or virtual teaching sprang into existence, people started thinking about the advantages and disadvantages of it versus in-person teaching or courses. Drexel University [2], for example, lists four benefits for online education. According to them, flexibility is key. Also, the online courses tend to cost less than in-person instruction. Third, it does not diminish student course options like what happens for in-person courses which can conflict in time. Last, students do not need to be local and can come from all around the world increasing thus the students' network and horizon.

As for online teaching, it divides into two main categories: synchronous and asynchronous [3]. The difference is that the former provides real-time teaching of students in a course, whereas

the latter lacks the real-time nature of delivery. By this definition, even “in-person classes” fall under the “synchronous” definition. Elements of “synchronous” teaching involve writing in different forms (chatting, texting, emailing, etc.), audio and/or video of the course participants (teachers and students)/material. As for the “Asynchronous” teaching, this could also entail all of the above elements, just not in real-time.

The word “virtual” teaching implies audio and video. Virtual teaching could be either synchronous or asynchronous. Whereas for the author, the word “virtual” implies synchronous delivery, this is not a universally held definition. For example, [4] defines it as “interactive, two-way online or distance education that happens in real time with a teacher”. The same reference defines “asynchronous” as learning that occurs “virtually online and through prepared resources, without real-time teacher-led interaction.” This reference indicates that “virtual” is by default an “asynchronous” modality. One reference [5] agrees with such definition as it too refers to Virtual Education as happening electronically without any face-to-face components.

However, other sources do not define virtual as necessarily asynchronous. For example, [6] refers to it as learning without physical sharing of space/classroom, whereas [7] refers to it as an online learning environment that allows all sort of interaction (communication, collaboration, idea exchanging, etc.) that is not physical in nature.

The COVID-19 crisis has thrusted online education in the front stage worldwide in terms of learning and teaching modalities. This is more true in the developed world. Concepts like “social distancing” to reduce the virus spread could be served nicely by online teaching and learning. Other health orders or rules pertaining to mask use and minimizing touching of things by many people, made online/virtual teaching/learning even more appealing and reasonable/logical.

In light of above, the majority (or two-thirds) of US higher education institutions [8] had planned for online teaching in Fall 2020. However, once the Fall 2020 actually came, only 20% of institutions ended up offering in-person courses. In fact, only 16% of two-year public institutes offered in-person teaching and learning! These numbers show just how pervasive the move to online teaching/learning was in the USA.

As for this paper, it discusses the personal experiences of the author with his full immersion into online teaching in Fall 2020 for a graduate course (ME512 Introduction to Continuum Mechanics) in the Mechanical Engineering Department at the University of New Mexico (UNM). UNM is a four-year public institution which is also classified as Minority Institution (MI) and a Hispanic-Serving Institution (HSI). For ME512, the author was supposed to teach it as a hybrid course (about half the students in-person with the teacher, and about half remote or live online). However, one week before the semester started, the University switched all students to a pure online modality.

With this sudden change in plans, the teacher and the student had to adapt to something different. More importantly, the teacher had to quickly switch his course offering and its materials to suit an online modality. Others in the meantime, had since the Spring 2020

semester to adapt to such modality. After intense and accelerated thinking, the author determined that he will meet synchronously with all the students live online via Zoom (since the University had a license for it). However, since no digital material was prepared for the course during the summer, the author requested a document camera to enable hand-written notes or explanation of materials to the students. UNM supplied the teacher with a document camera (HoverCam Solo 8 Plus Document Camera) shown in Figure 1. This is a USB-powered device that connects to a computer. This set the stage for the author to offer his first-ever fully live or synchronous teaching experience for a whole semester. The rest is just history and I herein share my personal experiences with others via this article.

Figure 1. Document camera used by the author in the ME512 course

There has been other published works that compared online courses to their in-person counterparts. For example, LaMeres and Plumb (2014) [10] found that online delivery is as effective as in-classroom offerings. This was with respect to converting an undergraduate digital circuits course from in-person to online. Even when it came to a lab (an undergraduate digital systems lab), they found similar results when they implemented a “remote lab” approach.

Another work that found student success in the online modality comparable to success in a traditional format was by Reid (2006) [11] in the Electrical and Computer Engineering Technology Department at IUPUI. This involved the conversion of two courses (Digital Fundamentals and C++ programming) from a traditional lecture / laboratory format to an online format. However, serious issues were found with student retention and with how much students were satisfied with the online format.

A third work yet on comparing online to in-person formats of a course was performed by Pisupati and Mathews (2008) [12]. When they looked at assessment data, in particular quizzes, midterms and finals, they found pretty identical results. Similar to reference [11] though, they found that the students had a negative outlook on the online modality in terms of its difficulty or perceived challenges.

A fourth related reference is by Douglas (2015) [13]. It was focused on an engineering statics class. It was concluded that "there was little to no difference in content mastery between students who completed the online and face-to-face sections of the class". This was based on identical proctored exam scores. Similar to reference [11], they also noticed significant problems with retention, i.e. with withdrawals and non-completion rates, compared to the in-person modality.

A more recent related work is by Khraishi and Denman (2018) [14]. This was for a course titled "Energy, Environment and Society" which is an undergraduate course taken mostly by mechanical engineering students. Although the midterm and final exam scores seemed similar, there was overall lower letter grades and course component attainments. Specifically, the course components that got adversely affected involved group work: group homeworks and group presentation. It appears that the lack of in-person meeting for group members affected the communication and grouping needed to better accomplish the group tasks. Also, weekly quizzes were not part of the in-person offering but were done online. Since these quizzes were timed, frequent and with no due date/time extensions, several students missed one or more of them which eventually helped bring their overall grades down. Under this work, no analysis of retention was performed.

Once the COVID-19 pandemic came crashing on the world scene in the early months of 2020, there was a lot of scholarly activity suddenly dealing with the effect of this crisis on teaching & learning especially in an online modality. For example, for an introductory digital electronics course, Marcus George (2020) [15] reported general student satisfaction with the shift to online teaching as well as final exam scores comparable to previous years. With respect to medical students in the UK, Dost et al. (2020) [16] have surveyed thousands of them about the switch to online education. It was found that a majority of the surveyed pointed out to the flexibility offered by online teaching platforms. It was also found that family distractions (26.76%) and poor internet connections (21.53%) were the biggest detractors associated with online learning. The work of Co and Chu (2020) [17] focused on developing online teaching for basic surgical skills training. They found that the majority of students (73.4%) felt that the online learning was no more difficult/easy than conventional learning as far as learning instrumental knots. They also found out that 40% of students highly recommended the new web-based surgical skills learning. Another COVID-19 inspired article was by Lee (2020) [18]. An interesting outcome was reported by the author for online teaching of chemistry during the pandemic. It was reported by the author that the synchronous online lectures had a smaller satisfaction score (2.86) compared with the asynchronous lectures (3.40)! The author attributed this to possibly the flexibility offered by asynchronous lectures. The last reported work here is by Guo (2020) [19]. This reference reported a bigger drop in average test scores of 14.5% for the students who did not attend the synchronous sessions. Students who did attend the synchronous sessions suffered a smaller drop of 3.5%. It was also reported that students who did not attend the synchronous sessions found the course more difficult. It is important to note here, however, that the synchronous online sessions were optional and not mandatory.

It is worth mentioning at this juncture that there aren't published works on the effects of the sudden switch to online learning caused by COVID-19 in the Fall 2020 period. This work presents one of the earliest works on this topic with hope that more educators share their information with the rest of the higher education community worldwide.

Methods:

For this paper, the author relied on a fully-online and synchronous teaching modality to gather the info written in this paper. Specifically, the modality was invoked for a graduate course with an enrollment of less than twenty students. For live lectures, Zoom was utilized. For every lecture, a recording of it was made and a document camera was used. The document camera lively showed the instant hand writings of the teacher regarding any explanations or notes. The author also relied on personal reflection and internal comparisons between the perceived plusses or minuses for full-online teaching versus in-person teaching.

In addition, a survey mechanism was employed. Here a survey was distributed, via a web-link utilizing SurveyMonkey, to ask the students how they felt about the course. Also, the University distributes end-of-semester course evaluations to all students. These were collected and compared to pre-COVID evaluations of ME512 (i.e. the same course in question). Lastly, grades from before COVID and grades at the end of the Fall 2020 semester were contrasted and any observations noted.

Results and Discussion:

The author has engaged in reflection and thought processes to compare, in his head, his first virtual live online course (i.e. synchronous modality) with his prior in-person offerings of the same course. Below is a discussion of any advantages or disadvantages seen by the author:

1- The live Zoom sessions allowed the teacher to see the student faces rather continuously or up close. It was a requirement that student login with video to the class sessions. This unlike a lecture hall/room with my back to them as I write on the whiteboard. This situation has the advantage of catching who is engaged listening and who is astray (or worse sleeping). It is a hallmark of this professor to continuously ask questions during lecturing to actively engage the students. Another reason why the student had to stay attentive is that other students in the class can also see them (it was a small class with 18 students). This situation is opposite in part to what happens in-person as the teacher's back is to the students a significant amount of lecture time. I actually felt a pretty good control over the happenings of the class time much more so than I felt with in-person teaching.

2- This course has a required textbook assigned in it. The teacher closely uses the textbook in every lecture. The book pages were shown to the students via the document camera. Teaching with Zoom has allowed me less intense class preparation since I can peek back quickly

into my textbook and therefore do not have to remember all my class prep. That reduces class prep time and also makes me look better prepared.

3- Not being in a classroom, I was able to avoid the messiness of chalk or dray erase markers, and the eraser of course. That was made possible via the use of a document camera which was utilized in the same manner as whiteboard use. Another advantage for the document camera use, is that I did not have to re-draw pictures from my textbook as I could just slide the textbook under the doc camera to show the pictures. This was a tremendous time saver as in the past I would re-draw what is in the textbook (to less picture quality I might add). This time saving was great as it allowed me to do more in-depth discussion of textbook material. This was attainable since I was no longer in a rush in class and therefore it enabled me to spend more time explaining the course material and engaging the students more.

4- A main advantage of the document camera was to allow the teacher to flip back and forth between new and old material covered in prior classes. This had the benefit of being able to continuously remind the students of the covered material and to continuously establish connections with this previous material.

5- Sitting in my office chair "Zooming" have saved my legs so to speak! Long gone are the standings twice a week for about one and half hours. I definitely felt more relaxed and felt more comfort being able to sit in my high-back office chair.

6- In the class, I used to have to raise my voice to reach the extent of the lecture room, especially if my voice is low due to sickness or being down that day, and especially if it is a large lecture hall. With Zoom, I can just turn up the knob on the audio or the students can do the same on their end. That is all that is needed for one to hear better.

7- I also saved more time from my day since I no longer have to drive to the lecture building or walk to it. Any time savings was spent on more prep time.

8- One point of concern to me was on the manner by which the exams would be conducted and if there will be opportunities for dishonest behavior. At the outset, I would here note that my exams are open book exams. The way the exams unfolded was by me showing/sharing the exam question on the Zoom screen. The students would then work on answering the problems on blank pages they have. Once done they would either take a picture and email to me or scan and email to me. During the exam I would be facing every student up close (virtually up close that is) and know what they are doing in front of me. As it turned out, my initial concerns of any dishonesty appeared unfounded as I did not see any indication of that.

9- Another benefit for taking the exams live via Zoom was that whenever any student asked a question, all other students heard it and heard the teacher response. They can also comment in the chat box and share weblinks and other info. For in-person teaching it was sometimes hard to hear students sharing in the class.

10- I practice in this course a version of the "one-minute problem" or two-minute problem. I ask the students to pre-read the textbook chapter or parts of it, and then in class I ask them to solve some relatively quick problems based on material we just covered in the lecture. Pre-COVID they used to do so in groups of two but using Zoom they were asked to work on them

individually. Although collaborative work on such problem is definitely a plus, there is value in individualized attention to each problem. Furthermore, once some students solved the problem, they are asked to share their solution with others. Zoom allows easier oral communication with everyone else logged in. However, it is hard for students to share in writing the details of their solution since they do not have a document camera like the teacher nor can they write things on a white board for all to see.

11- The last benefit to mention here is the ease by which the teacher can share with the students online or computer resources. Zoom allows the sharing of any open app with the audience/participants. In a standard in-person classroom, this is not doable unless it is a specially set classroom equipped with monitors & teacher computer, or the students each have their own laptop/cell phone by which they can access info and use a website.

The above was subjective information about virtual teaching in comparison to in-person teaching. However, it is important to supply more objective data that is not personal to the teacher. For this purpose, three things have been done: (a) surveying students about their feelings regarding this virtual class, (b) comparison of course evaluations with pre-COVID evaluations, and (c) comparison of course grades with pre-COVID course grades.

A survey composed of 8 questions was sent to the students for their feedback. The goal of the survey was to probe their feelings about the course, specifically how they felt about the switched modality to a pure online format from hybrid instruction. Also sought in the survey was their input on the general COVID atmosphere impacting their higher education pursuit. Table 1 shows the different survey questions.

Table 1. Questions used in the survey of students

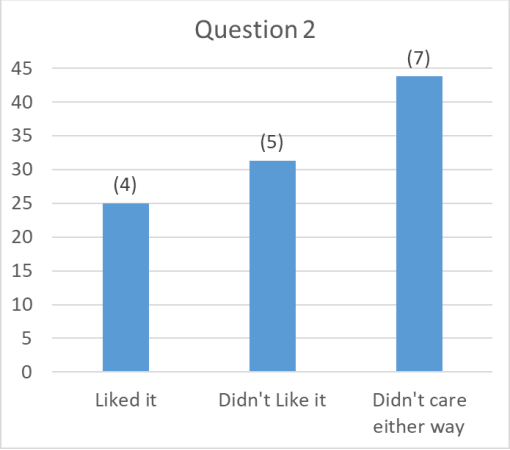
Question #	Question text
1	Is this your first fully-online course? Part online like what happened end of Spring 2020 does not count here as “fully-online”
2	When the University switched this course to a fully-online format right before the start of the Fall 2020 semester, what was your feeling then about such switch?
3	If this is your first fully-online course, how did you feel about this virtual/online experience with taking this course?
4	Based on your experience with this course, do you think that the virtual/online format has *any* advantages (or plusses) over the in-person class format?
5	Based on your experience with this course, do you think that the advantages (or plusses) for virtual/online courses are more than the advantages/plusses for in-person class courses?
6	Based on your experience with this course, do you think that you would consider (if you have the choice) taking more virtual/online courses in the future even if the COVID situation is resolved?

7	Given the COVID situation, do you think that the University did the right thing in moving this course to a fully virtual/online format from the in-person format?
8	Do you prefer the use of a live document camera for explaining course material (as in this course) OR pre-prepared PowerPoint slides with the class material already on such slides?

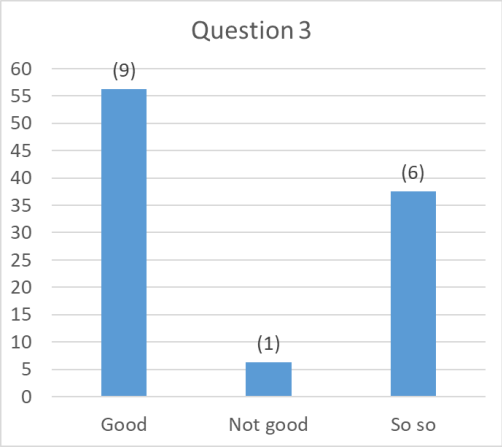
Questions 1 & 4-7 had a “Yes” or “No” answer requested. The results of these questions are given in Table 2. However, there was a triad of possible answers/choices for questions 2, 3 and 8, the results of these questions are presented instead as bar charts. See Figure 2.

Table 2. Answers/Replies to Questions 1 & 4-7 of the survey. The number in parenthesis is the number of responses.

Percentage results	Question 1 (16)	Question 4 (16)	Question 5 (16)	Question 6 (16)	Question 7 (16)
Yes	18.75 (3)	68.75 (11)	31.25 (5)	68.75 (11)	93.75 (15)
No	81.25 (13)	31.25 (5)	68.75 (11)	31.25 (5)	6.25 1)



(a)



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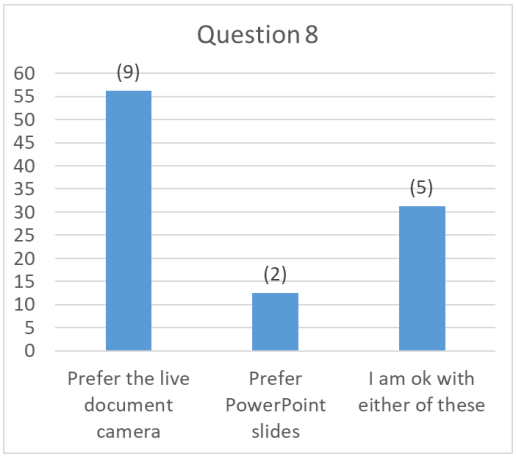

(c)

Figure 2. Bar charts for questions 2, 3 & 8 on the survey. The number in parenthesis atop of each bar represents the count number, i.e. number of students answering this way.

It is clear from Question 1 that for a majority of the students this course was not their first full-online course. This result is important since the latter questions are in regard to the students' online course experiences. When the switch to a purely online format happened at the beginning of the Fall 2020 semester, 31.25% of the students did not like the switch (Question 2). Despite that, only 6% (1 student) did not like their virtual online experience with this course (Question 3) in Fall 2020. Additionally, the majority of the class (about 70%) thought that the online format has advantages over the in-person format (Question 4). This maybe explained based on the fact that the vast majority of students had other online course(s) in the past. In other words, they may have developed a comfort level for such modality especially if they have work or other time commitments on their daily schedules. Still the students did not think that online offered more advantages than in-person (Question 5). This might indicate students' preference to in-person format. When asked if they would consider taking more online courses in the future, even not in the shadow of a pandemic, most students concurred that they would (Question 6).

One of the most important or telling questions is Question 7. In this question, the students are asked if the University did the right thing (given the pandemic of course) in moving the course to a fully-online format and eliminating the in-person meetings. A super majority of students, or 15 out of 16, agreed with that move. This is despite a third of them were not happy originally with the sudden shift to a pure online format (Question 2). This is an important statistic since a lot of universities, as mentioned in the **Introduction**, swiftly changed their in-person offering to primarily online offering of courses. It appears that most students are in agreement with the decisions of administrators at universities/colleges in moving away from in-person courses (at least for Fall 2020 semester/trimester).

The last question (Question 8) focused on the use of the document camera (see Figure 1) in the course. Students were asked to show their preference to this use versus using PowerPoint slides like many course do. The replies to this question show that one 12.5% would rather see PowerPoint slides instead. The hypothesis of the author was that most students will not mind the document camera, or rather be more comfortable with it, since it more closely mimicked how whiteboard writing takes place. Sure enough, the results confirmed the author's hypothesis.

The average course grades, and standard deviation, were compared between Fall 2020 semester and Fall 2019 semester (the last time the course was taught primarily in-person). The comparison is shown in Table 3. A quick look at the table shows that the average score is almost the same. Statistically, such results are not significantly different if one takes into account the data spread with the standard deviation. The standard deviations are more varied than the average but both indicate a tight distribution if one assumes a normal distribution model.

Table 3. Grades for the ME512 course, as taught by the author, for two years/modes of teaching

Course Grades	Fall 2020	Fall 2019
Average (out of 100)	82.83	83.87
Standard Deviation	6.61	9.49

The last things to compare are the course evaluation results. At the University of New Mexico, students are asked to answer two questions and rate each from 1-5. The two questions are: 1- Please rate the instructor's overall teaching effectiveness, and 2- How comfortable do you feel approaching the instructor with questions or comments? The data for the course evaluation are given in Table 4. The table shows that the online course (2020) was no worse than the primarily in-person course (2019). In fact, the online course evaluations are higher than the last time the course was taught in-person.

Table 4. Course evaluations for ME512 taught by the author

Course Evaluations (1-5 rating with 5 being highest)	Please rate the instructor's overall teaching effectiveness:	How comfortable do you feel approaching the instructor with questions or comments?
Fall 2020 (18 students)	4.17	3.94
Fall 2019 (21)	3.90	3.62

From Tables 3 & 4, it appears that both the course evaluations and course grades were not different than the in-person course. In fact, the course evaluations improved. Other researchers reported similar results [10-14] (LaMeres and Plumb (2014), Reid (2006), Pisupati and Mathews

(2008), Douglas (2015), Khraishi and Denman (2018)). However, unlike these referenced studies, this current work did not encounter negative feelings about the online modality. However, it is to be noted that the current work deals with a graduate course whereas the referenced works deal with undergraduate courses.

As with regard to teaching under COVID conditions, this paper showed that the students did not mind the switch to a fully-online experience. This is in-line with the recent studies [15-19] reported for late Spring 2020 teaching. As noted in these references and this paper, however, there were challenges associated with full immersion in online education.

Conclusions:

The author of this paper is reporting an overall positive experience from switching to purely on-line course modality (taught live via Zoom) due the COVID pandemic. One of the important outcomes of this paper is that students, via survey, showed understanding of the University's action to switch in-person courses to online courses in response to the virus crisis. Such data should give higher education institutions relief and assurance of their COVID-driven decisions. Another outcome of the study is that it seems students are more now open to taking more online courses. This outcome was not surprising given that most students thought in the survey that online courses offer some advantages over traditional in-person teaching.

Other important conclusions regard course grades and course evaluations. Such grades and evaluations did not get negatively impacted by the sudden switch to purely online or virtual modality of teaching. In fact, the course evaluations for the same teacher went up from the last time (2019) the course was taught.

Based on all of the above, it appears that it is possible, for some courses at least, to fully switch their modality to online only.

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