

## Potentials and limitations of Face to Face and Hybrid Teaching Modes

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### Abstract

Higher education has been faced with a particular set of challenges in response to COVID-19. To ensure continuous and quality education for students, The Citadel has adopted two teaching modes: a traditional mode and a hybrid mode, which incorporates alternating online and in-person attendance. Through surveys and daily class-comprehension quizzes, we are able to correlate academic performance with class attendance mode. Quizzes are tracked to specifically assess the impact of online versus in-person attendance. Surveys were implemented at the beginning and the end of the semester to probe student perception and sentiment toward these two teaching modes. To improve the statistics and generalizability of the results, this study was conducted in several courses across five different instructors. Potentials and friction points for each mode of instruction are identified from the results.

### Keywords

Instructional Delivery Mode; Student Perceptions; Teaching Effectiveness, Online Learning

### Pedagogy During COVID-19

It is a balancing act to both follow the Centers for Disease Control and Prevention (CDC) guidelines regarding social distancing and to also offer face-to-face instruction. Based on classroom size and availability, adjustments have been made in instruction, meaning not all students can attend in person as they traditionally would. To ensure continuous and quality education for students, The Citadel has adopted two synchronous teaching modes:

- 1) A traditional teaching mode, which is functional when the class size is small enough and the classroom is big enough for everyone to meet face to face each class period while still satisfying CDC guidelines;
- 2) A hybrid teaching mode, which is executed for larger class sizes and laboratories where the number of students exceeds classroom capacity. In the hybrid mode, half of the class meets via a videoconferencing software while the other half meets face to face; these groups rotate each class period.

In this study, the learning opportunities and limitations were investigated both qualitatively and quantitatively to better understand how the course content is being received by the students. Course materials and access was provided through the Canvas learning management system (LMS) and a synchronous connection with students using a Zoom platform supported by a Swivl™ robotic tracking system with an attached iPad. All assignments, exams, quizzes,

surveys, discussions, forums, and dissemination of course content was provided through Canvas LMS.

The hybrid teaching mode provided a set of advantages related to the traditional mode, such as time spent in engaged interaction and activities that require in-person delivery, e.g. labs, while also providing physical distancing and a high degree of flexibility in case students need to be away, e.g. quarantined. Hybrid teaching also provides benefits, such as an improved opportunity to switch to complete remote delivery in case of college closing and also the ability to access Zoom recordings of lectures and in-class meetings at a later time. The disadvantages of hybrid teaching were typical for online instruction: problems with internet access or broadband, finding and maintaining a quiet space, and staying engaged.

Midterm and final exams are administered through Canvas LMS and provided students the opportunity to take exams in either a classroom or a location of their choice. The final exams were all taken remotely and required LockDown Browser® with Respondus Monitor® for distance exam proctoring. Unfortunately, if a student has questions during the exam LockDown Browser® prohibits students from contacting the instructors through the internet. exams were scheduled with an additional hour to encompass extra time for troubleshooting technical difficulties.

### **Student Participation and Performance in Distance Learning**

Numerous studies have investigated the differences in outcomes between distance learning and traditional instruction by comparing cognitive and affective learning.<sup>1</sup> Literature shows that while affective learning decreased for students in the distance format course relative to the traditional format, cognitive learning was comparable and implementing strategies to enhance social presence may improve the overall learning experience and make distance learning more enjoyable for students. Instructor presence and location greatly influence student participation and satisfaction and minimize negative impacts related to technological issues. With instructor-prompted discussions, even distance interactions can create engagement similar to the in-class one. Audio difficulties and loss of internet connection that cause delays in class appear to have a greater impact on student satisfaction than do visual difficulties.

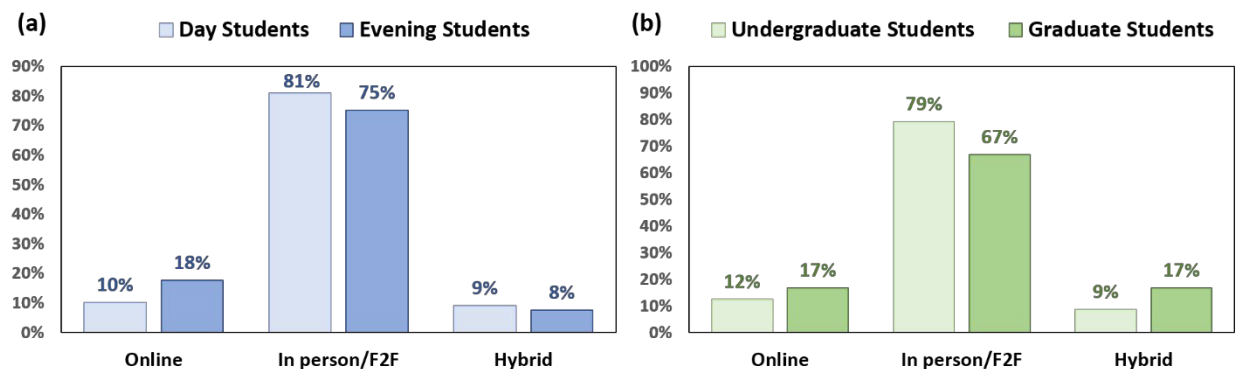
The use of technology in the classroom expands instructional options for faculty for administering learning objectives through pictures (e.g., video, animation, graphics, or illustrations) and words (e.g., printed or spoken words). Screencasts used in the classroom can take the form of recorded lectures and such online presentations might be particularly useful for disciplines that are “equation heavy.”<sup>2</sup> Supplementary resources such as shorter mini-lectures, explanations of homework, or exam solutions can enhance students’ understanding and assist them in grasping fundamental ideas.<sup>3</sup> Viewing screencasts on new topics or procedures can be assigned as homework prior to class meetings.<sup>4</sup> In this way, classroom time might be freed up to focus on the application of concepts rather than on data-accumulation and the passive reception of information. This use could allow for more active forms of learning during times when instructors and students can interact in person.<sup>5</sup>

One aspect of distance teaching is flexibility with examination management, which can be either synchronous or asynchronous, and has a varied amount of instructor’s assistance related to its

type. With recent increased access to learning and distance education platforms, like Canvas LMS, it became more practical to use computer-based exams that can be graded automatically thus allowing asynchronous treatment. Literature shows that when given a choice of when to take an exam, many students choose to take it toward the end of the exam period window and, on average, perform worse than students who choose earlier times.<sup>6</sup> Weaker students tend to put off the exam, while stronger students tend to take the exam over a more uniform distribution of times, thus indicating that weaker students procrastinate more which negatively correlates with academic performance.<sup>7</sup>

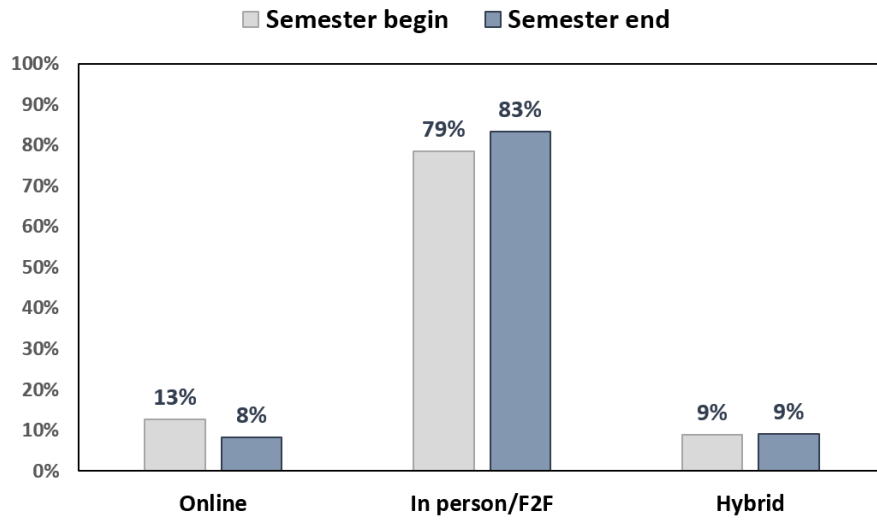
## Student Perception Survey Results

To compare, qualitatively and quantitatively, the three modes of teaching (online, face-to-face, and hybrid), students were surveyed at the beginning of the semester about their preference. The Citadel has two different undergraduate student populations: day students who are almost entirely fulltime residential students and evening students who are non-residential, part-time students. Day, evening, and graduate students were all surveyed. In Question 1, they were asked about their preference in online, face-to-face and hybrid modes of teaching. **Figure 1(a)** shows both day and evening students have higher preference in face-to-face teaching and online and hybrid modes are scored close to each other. Comparing undergraduate versus graduate students a similar trend was observed as shown in **Figure 1(b)** although the graduate students were more open to online and hybrid instruction.

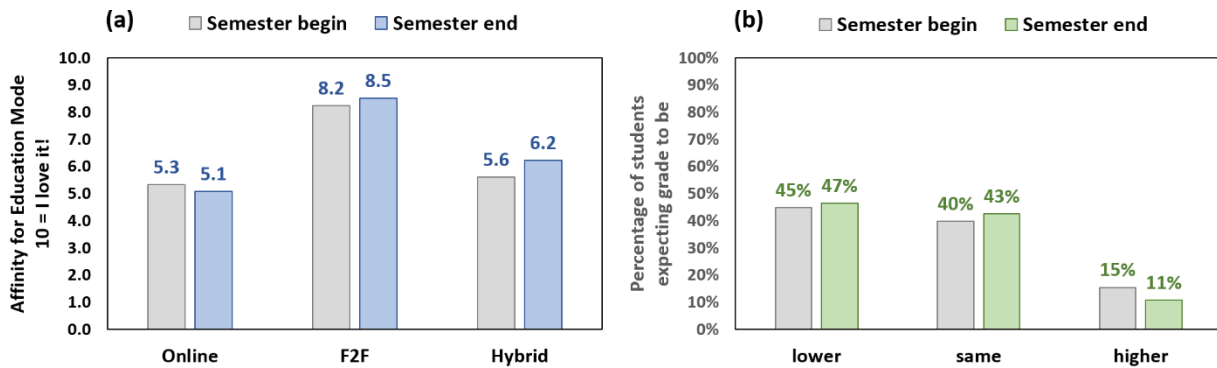


**Figure 1.** Preferred mode of education at the beginning of the semester. (a) Day students are compared to evening students. (b) Undergraduate students compared to graduate students.

At the end of the semester, the same survey was sent to students to see if their preference had changed after completing a semester in hybrid mode. The results for all students (i.e., day, evening, and graduate students) are shown in **Figure 2**. As it can be seen from **Figure 2**, preference of students in face-to-face teaching increased with a decrease in preference for online teaching. In Question 1, they had to choose between face-to-face, online or hybrid modes of teaching but to have more robust quantitative results, they were asked to rate their preference with respect to face-to-face/online/hybrid modes of teaching from 1 to 10; 1 least favorable and 10 most favorable mode of teaching. Results, shown in **Figure 3(a)**, show face-to-face mode is most popular, followed by hybrid and then online teaching. The trend is similar to **Figure 1** although after rating each mode of teaching, the difference between face-to-face and hybrid/online teaching is not as large as in **Figure 1**. This shows there are potentials for hybrid and online teaching to be competitive with face-to-face teaching. Also, students were asked how they anticipate their grade being affected because of hybrid mode of teaching. **Figure 3(b)** shows majority of students expect to obtain the same or lower grades.



**Figure 2.** Preference of all students (i.e. day, evening and graduate) regarding mode of teaching



**Figure 3. (a)** Rating of students with respect to Online, Face-to-Face and hybrid mode of teaching at the beginning and end of semester. **(b)** Student’s expectation on effect of online teaching on their grade.

### Students’ Comments Survey Results

In addition to finding out about student’s preference regarding mode of teaching, it was of interest to learn about the reasons for that preference. Six more questions were incorporated into the surveys to investigate the students’ reasons for their preference, in addition to the strengths and weaknesses of each mode of teaching. The same survey, with the same sets of questions, was administered to students at the beginning and the end of semester. Below are representative student comments.

#### *Benefits and strengths of in person / F2F education mode*

- In person allows for a group understanding and teaching of the subject and the ability to better interact with classmates

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- The ability to learn from classmates and interact with the teacher and his/her ability to adjust lecture based on their idea of how well the class is understanding
- I learn better in person. I find myself highly distracted online and it's difficult to discuss questions I have with the professor online as opposed to in person.
- It is much easier and take notes and see the board in person.
- I find it is easier to stay engaged and learn in an in-person class

### Challenges and limitations of in person / F2F education mode

- traffic/waste of drive time
- extreme threat of COVID-19 for all of the students and faculty

### Benefits and strengths of online education mode

- I get to stay in a comfortable place and I can usually get the work done on my own time.
- I can go at my own pace.
- Online discussions help me gained more knowledge and different viewpoints on topics

### Challenges and limitations of online education mode

- Online is tougher on the student because it requires more time spent learning the material in my opinion.
- I feel like with an online course I end up teaching myself a whole lot more.

### Benefits and strengths of hybrid education mode

- I have a busy schedule and it can save a lot of time to be able to attend a class via Zoom
- Lessons are recorded/ prerecorded. If there was something that I didn't quite understand in the homework I was able to reflect back on to the lecture and pick up on helpful tips that were stated in the lecture. In other words, after applying what I know on the homework and getting stuck, I could go back and refine on topics I didn't fully understand.
- Hybrid allows for us to take extra time on our own to look over material that may be confusing.
- I can look up materials in real time to get a quick understanding on topics that I would need a refresher on.

- I don't have to worry about being late to class.
- I can eat/drink to keep myself awake without bothering others.
- Students can attend class and participate from anywhere.
- Accessibility at any time for lectures. Ability to learn at an individual's pace.
- Develops a self-motivated individual.
- It makes the work-life balance a less stressful.

#### Challenges and limitations of hybrid education mode

- I preferred being able to see and hear the instructor in person without dealing with audio and visual delays and impairments
- Limited camera view, distorted video or audio based on connection, limited class involvement.
- Both fully online and fully in-person are much better options than the hybrid system. It's pretty much online with extra steps. It's just a much lower quality product and I don't think it will produce good engineers.
- It is much easier to see the board in person.
- Please invest in better cameras so students online can see what a professor is teaching and read the board notes clearly.
- There are connection problems.
- I can't focus on the teacher as there will be internet issues, distractions, and audio issues.
- It is hard to get everyone involved and have solid participation.

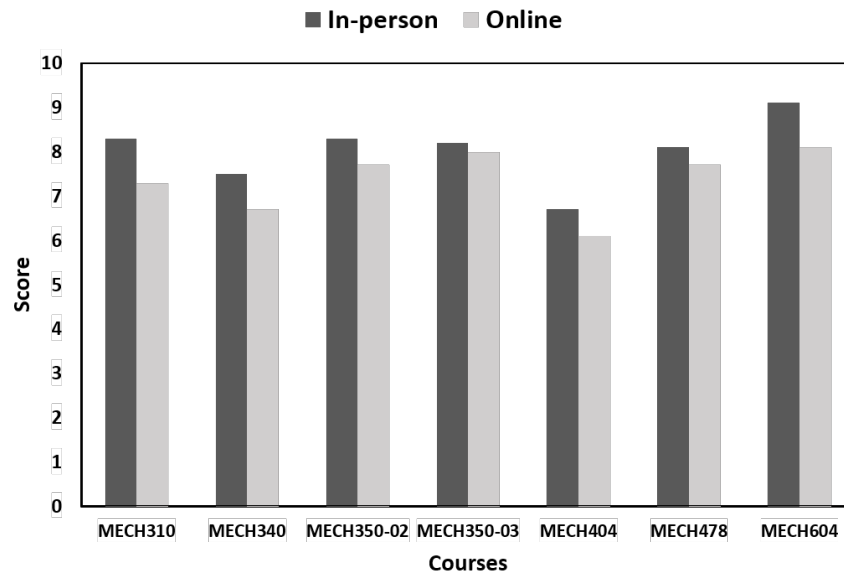
#### Additional relevant comments

- It depends on the class. If the class is heavily math oriented then usually I like to have a professor there to help me but if the class is not I don't mind watching a video and doing it online.

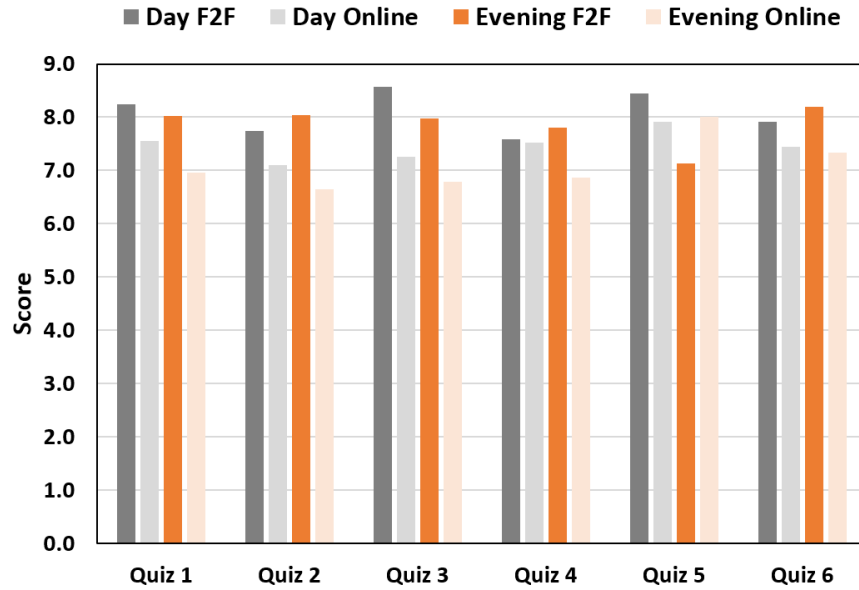
It is important to note that some of these comments definitively link to the classroom experience at The Citadel. Common attributes of the undergraduate education at The Citadel include small classrooms with high visibility of the boards, small class sizes so there is a high level of interaction between the faculty and students, mandatory class attendance with consequences for absence or even tardy arrival, rules against eating, drinking, and computer usage during class time, and a strict military dress code for the day students. Online and hybrid education modes impact these institutional constraints regarding the classroom experience.

## Student Performance Results

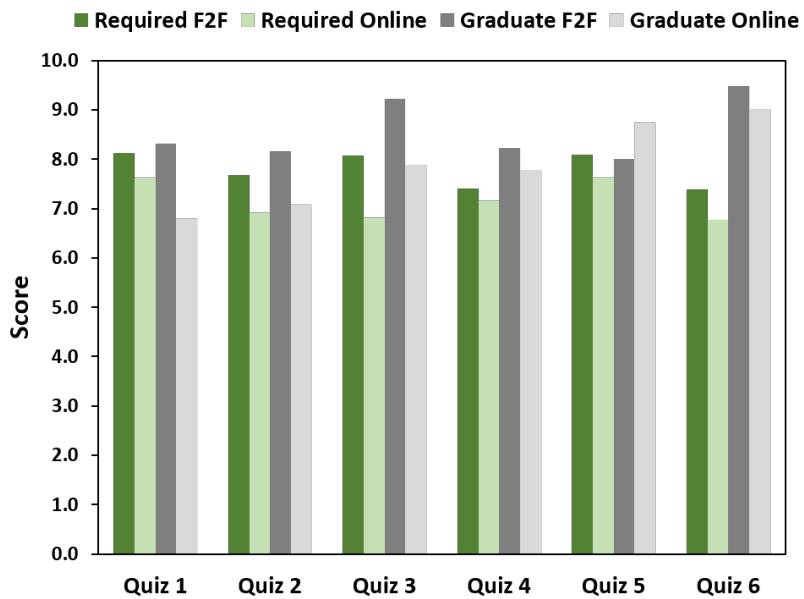
To validate students' answers regarding preferred mode of teaching, six quizzes were given to students in seven different classes during the semester, evaluating their performance when taking the course face-to-face or via Zoom (i.e. online). The quizzes were alternated to ensure all students completed quizzes after attending both face-to-face and via Zoom. The results for the seven different courses, as shown in **Figure 4**, indicate that the performance of students was better when attending class face-to-face rather than via Zoom. As seen in **Figure 1**, the results were analyzed based on day students versus evening students or based on graduate/elective classes versus undergraduate classes. The latter grouping was important as the students who choose to complete the graduate/elective courses tend to be more passionate about the topic and have specifically selected that course, meaning they are typically more invested in performing well. Performance of day students versus evening students is compared in **Figure 5**. Both were performing better when taking the class in person. Finally, performance of graduate students (or undergraduate students taking an elective course) was better when attending the class in person compared to online attendance (see **Figure 6**).



**Figure 4.** Performance of students through the quizzes across seven classes when taking the class online versus face-to-face.



**Figure 5.** Results of six quizzes for day and evening students taking in either face-to-face mode or online mode.



**Figure 6.** Results of six quizzes for graduate (or elective) versus required undergraduate course.



## Conclusion

Day, evening, and graduate students were surveyed at the beginning and end of the semester to investigate their preference regarding face-to-face, online, and hybrid modes of teaching. To verify the survey results, six quizzes were given to seven different classes. Based on survey results at the beginning of semester, face-to-face hybrid and online were preferred mode of teaching respectively. Surveys at the end of semester showed that face-to-face, online, and hybrid were the preferred mode of teaching, with hybrid being more favorable than online. From the student comments, the main challenges of online teaching are distraction and loss of focus; not being able to interact with classmates or professor during lecture time; less class participation and engagement; distorted audio and limited camera views. However, several advantages regarding hybrid and online modes of teaching were mentioned by students: being able to repeatedly watch a recorded lecture to improve understanding of challenging lessons or those missed during the lecture time; ability to learn on individual pace and pause the recorded video whenever required; being flexible regarding time and place for class participation. This study shows that although the face-to-face mode of teaching was the most popular and the most efficient mode, there is a potential for the hybrid mode of teaching to be a more successful method of instruction, provided technological issues are resolved and better engagement strategies are implemented.

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