

## **Which is better online or face to face? Comparisons of the same instructor and class taught in two modalities**

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# **Which is better Hyflex or face to face? Comparisons of the same instructor and class taught in two modalities**

## **Abstract**

While there is much literature that compares face to face with online teaching, hybrid models have less coverage. A unique opportunity for direct comparison of online and hybrid modalities presented itself in fall 2020 at a large Mid-Atlantic university. The engineering college teaches a general education course on the History of Engineering that is open to all majors. The course was developed about eight years ago and has been taught each semester and in several summer sessions ever since. There are no technical aspects to the course; it covers the history of engineering from the ancients to today, with an term paper at the end of the course that asks students to research and discuss a topic about the future of engineering.

In fall 2020 two sections of the course were taught by the same professor using two different modalities. One section was taught asynchronously entirely online. There were no required lectures or attendance. The other section was taught using a hybrid known as “hy-flex”, which allows students full freedom of attendance or online as they choose model. The hybrid course had all of the same online components as the fully online section, and also had a face to face lecture offered three days per week for 50 minutes where the instructor lectured using the same lecture slides as posted in the online class LMS. Students could choose whether to attend any or all in person classes. The same set of regular assessments were used for both courses.

Two models of course delivery taught by the same instructor provides a unique direct comparison of two different modalities. Significantly more students in the online course earned A’s than in the hybrid course. However about 10% of online students failed, which did not occur in the hybrid class. Student perceptions of the course were quite positive, with hybrid students rating the course slightly higher than online students, despite earning somewhat lower grades on average. This indicates that online is better for some students but less effective for others.

## **Introduction and Background**

Comparisons between online and face to face delivery have been made for many years, including comparisons of student learning between different modalities. Learning in courses delivered online is often found to be as good or better than in face to face. Students usually report a high degree of student satisfaction with online courses. Literature reports that online course delivery allows more time flexibility, which permits students to take the courses online that they may not otherwise be able to take. [1], [2], [3]

Earlier online delivery was often a straight adaptation of existing courses. Many provided identical materials and assessments as face to face instruction. Online students were supported with limited distance learning support, such as discussion boards and frequent email. [2], [4], [5] Students tend to produce statistically better results in online and blended courses across all ages and disciplines. As online delivery became more common, courses were more intentionally developed or revised with online delivery as part of the course structure. [5], [6], [7], [8]

A trend toward developing courses with hybrid and online delivery is ongoing. The 2020 pandemic accelerated that trend, with students who take online delivery continuing to produce overall better scores and higher degree of course satisfaction than those who take face to face instruction. Most instructors and online technologies are seeking improved communication and engagement, which is improving online student satisfaction. [9], [10]

### Teaching Modalities

West Virginia University teaches a course in the history of engineering, a 3-credit general education course covering the foundational subject area of Human Inquiry and the Past, open to any undergraduate student at the university. The course is housed in the Fundamentals of Engineering Program unit of the engineering college and is taught by faculty from that group. It was developed in 2015 and has been taught each semester and in the summer ever since. It covers the history of engineering from antiquity through today. Assessments include weekly homework and quizzes, three comprehensive exams, four periodic reflections, and a term paper that has students consider societal impacts of future technologies. All assessments are delivered in the online Learning Management System. The homework requires that students read the book and answer fill in the blank questions about the reading. There are also one or two short essay questions asking students to explain or elaborate on the material. The quizzes are similar but have more multiple choice questions for convenience in grading. There are pools of questions for each homework and quiz from which a random selection are taken for each assessment so that no two students receive the exact same quiz or homework. The exams work the same as the quizzes but have their own pools of questions. The reflections require that students write a short paper about what they found interesting or surprising about the material, and how it fits in a broader context. They are asked to consider what problems people at the time were trying to solve and how later technologies were built upon earlier discoveries and innovations.

In fall of 2020 two sections were taught by a faculty member who had taught the course online once before, and it was offered to students in two modalities; online and hybrid known as “hy-flex”, which gives students the ability to choose whether to attend face to face lectures, fully online, or any combination at any time. Both courses used the same book, syllabus, schedule, assessments, and instructor, the only difference was the modality. All assessments in both sections opened and closed at the same time. Enrollment in the hybrid class was 34 while in the online class was 49 for a total of 83. Neither was an honors course, and students knew the modality when registering.

The hybrid course had face to face class that met three times per week in a reduced enrollment classroom in order to follow social distancing guidelines. Each class was connected by Zoom to allow real-time attendance, and each was recorded to allow for viewing at any time afterward. The online course was asynchronous, having no fixed lecture time. Those students were provided the opportunity to attend the live sessions by Zoom and were provided the links to the recordings, so they had access to the same teaching as the face to face sessions. While face to face attendance was necessarily restricted to those who were enrolled in the hybrid section, any student could attend online or view the recordings.

## Attendance

Records were kept of the in-person, live online, and recording views. It should be noted that the university went to all online course during weeks 2-4 due to an increase in Covid cases, so all attendance during those weeks was virtual. As can be seen in Figures 1-4, overall attendance trended downward during the semester, averaging 25 per class period (about 1/3 of total enrollment). Recording viewing remained fairly constant throughout the semester with an average of 3 students per class, and live online attendance was constant at around 9 students from week 5 onward. Most of the reduction was from in-person attendance. This indicates that some students quit attending lectures in any form and relied on the book and lecture slides to complete the assignments. Which version of the course the students were enrolled in who attended live sessions and watched recorded sessions is not available.

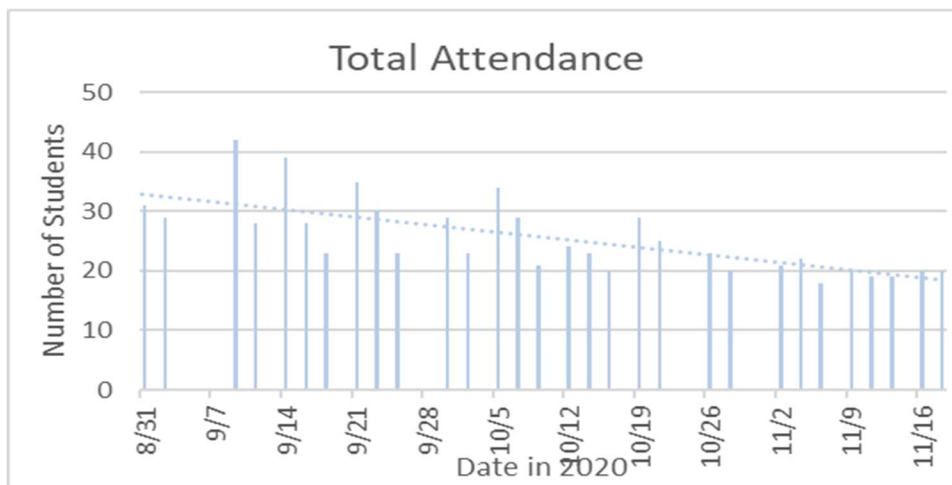


Figure 1 Total Attendance of all modalities

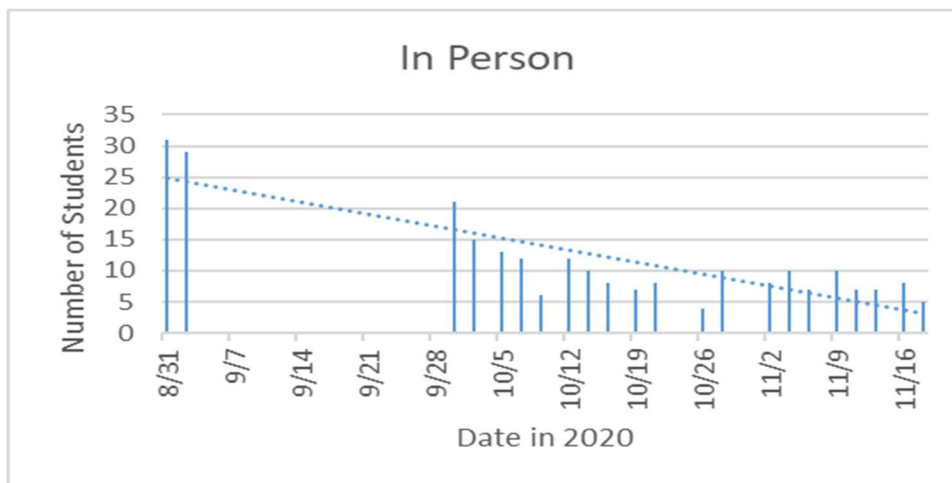


Figure 2 In person attendance. Note that weeks 2-4 were online only

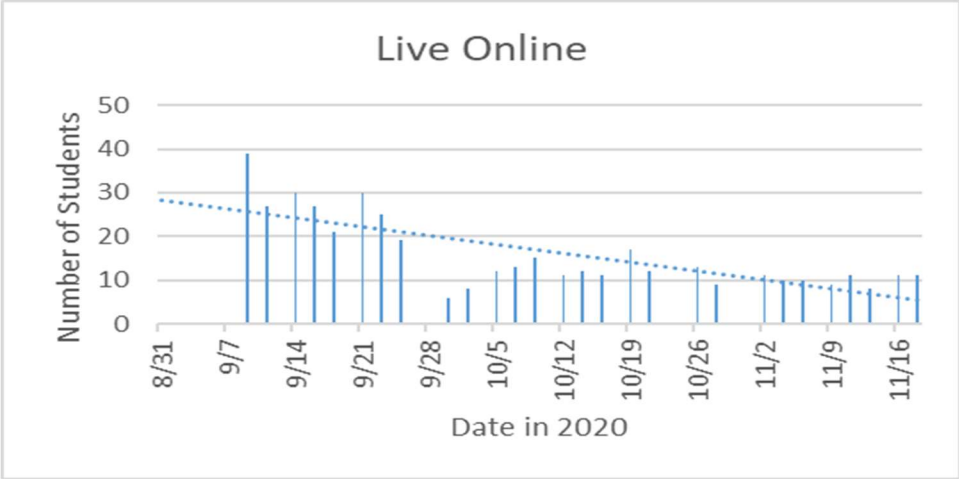


Figure 3 Attendance during live online sessions. Note that weeks 2-4 were fully online

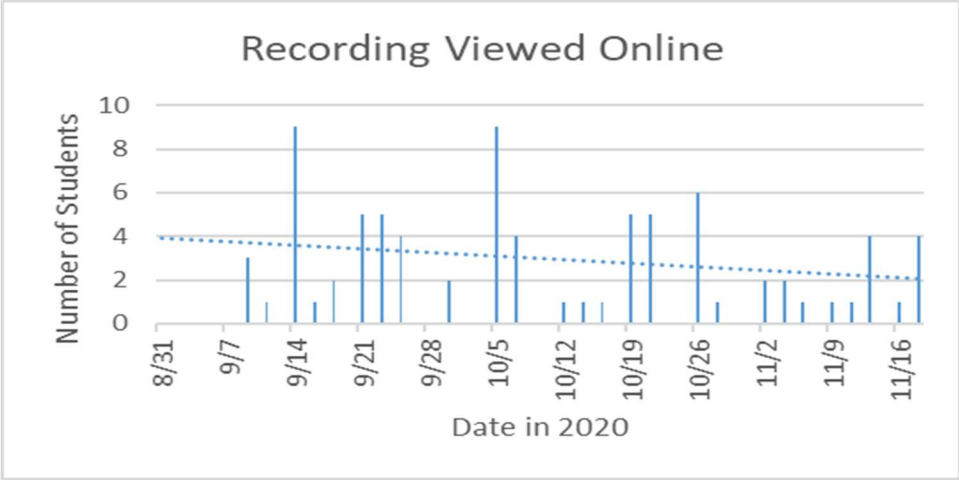


Figure 4 Attendance by views of recordings

**Final Grades**

Final course grades for each course can be seen in Table 1, while the distribution of scores can be seen in Figure 5.

Table 1 Summary of scores across two sections

| STATISTICS    | In Person | Online |
|---------------|-----------|--------|
| Count         | 32        | 49     |
| Minimum Value | 62.6%     | 27.2%  |
| Maximum Value | 99.0%     | 97.4%  |
| Range         | 36.4      | 70.1   |
| Average       | 84.7%     | 85.5%  |
| Median        | 87.7%     | 92.7%  |
| Std Deviation | 10.7      | 16.1   |

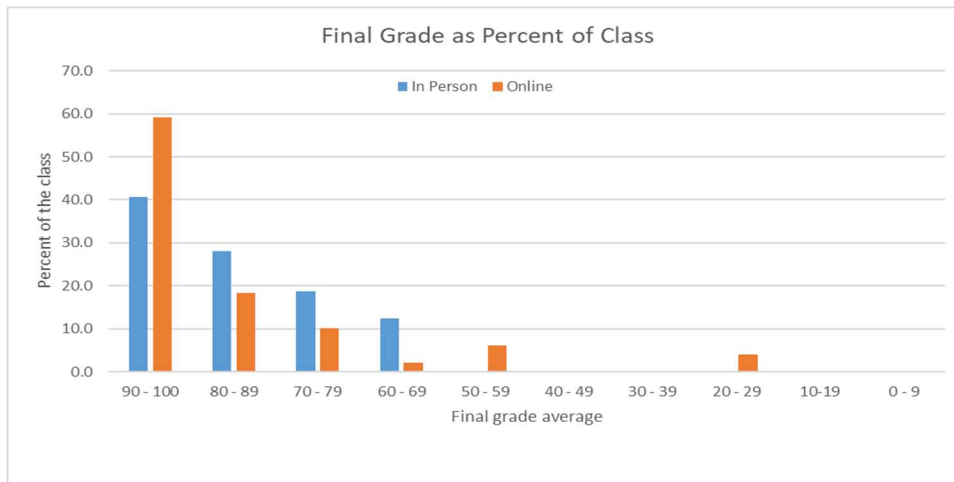


Figure 5 Grade distribution as a percentage of the class

Sixty percent of the students in the online section earned A’s, while forty percent of the hybrid students earned A’s. There were more B’s, C’s, and D’s in the hybrid course. However, about 10% of the online students earned F’s, while none of the hybrid students failed. Two of those F’s had considerably lower scores than were seen in the hybrid class. The averages were similar in both classes, while the median and standard deviation in the online class were slightly higher.

Student Evaluation of Instruction was used to gauge student attitudes about the course. Questions are posed in the form of a 5-point Likert scale, with response median scores of selected questions in Table 2. While all scores were quite high, face to face students rated learning and instructor related questions slightly higher than their online counterparts.

Table 2 Comparison of selected end of semester Student Evaluation of Instruction scores

| Question  | Median out of 5 |        |
|---|-----------------|--------|
|   | Face to face    | Online |
| Number of respondents   | 21              | 34     |
| Course content was thought-provoking.   | 4.79            | 4.50   |
| I would rate my learning in this course as excellent  | 4.55            | 4.17   |
| The instructor fostered a positive learning environment   | 4.92            | 4.71   |
| The instructor provided helpful feedback.   | 4.87            | 4.59   |
| The professor connected course content to its relevance to everyday life and the world beyond the classroom very well | 4.69            | 4.33   |
| I am happy that I took the face to face version of the course   | 4.75            |        |
| I am happy that I took the online version of the course   |                 | 4.69   |

Online students were asked whether they agree with the statement “I am happy that I took the online section,” and a similar question was posed to the hybrid class. Results can be seen in Figure 6. The majority of students in both classes responded that they were happy with the modality in which they took the course. There were a few students in the online course who strongly disagreed with the statement, which was not seen in the hybrid course.

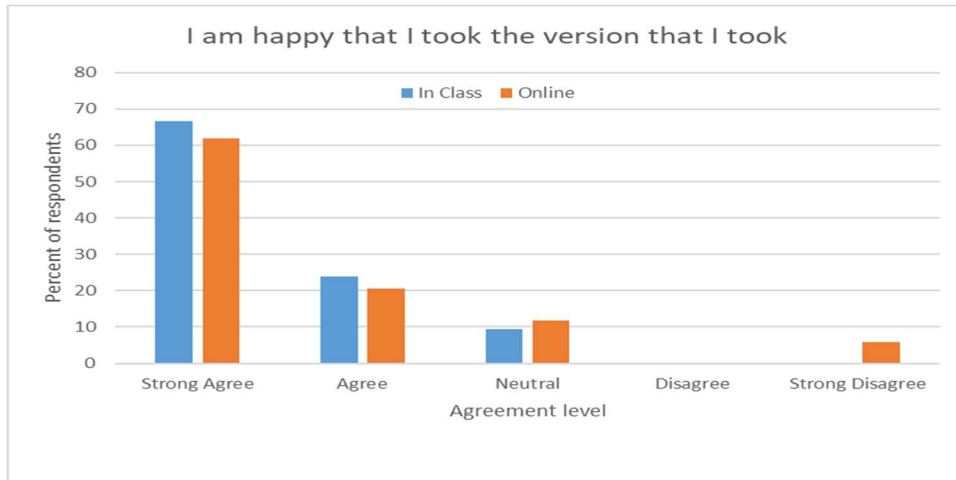


Figure 6 Student responses to whether they were happy with their choice of modality

## Conclusions

Students were offered three ways to attend lectures, with overall attendance averaging less than 1/3 of all registered students. Attendance decreased through the semester, with the greatest decrease coming from the face to face lectures. Significantly more fully online students achieved the highest grades than in the hybrid course. However, some failed the online course, which was not the case in the face to face version where no students failed. While overall student evaluations of the course were high, the hybrid course students rated communication with the instructor and overall learning slightly higher than the online students did. The perception of the online students was that their learning was slightly lower than the hybrid students, despite earning higher grades on average. Students in both versions indicated that they were happy with the modality that they selected. However about 10% of students in the online version strongly disagreed, while none of the hybrid student did.

These grade distributions and student perceptions suggest that some students do well with online courses, and can earn higher grades than taking in-person classes. But online isn't for everyone, and some students do more poorly with the online format. The question of which modality is better can best be answered with "it depends." Whether a student will do better or worse in an online format than face to face depends on that student's work and study habits and perhaps other factors, so students need to be aware of their own strengths and weaknesses. Having a choice of modalities offers more opportunities for individual success by covering more learning styles and learner types. These results reflect findings in comparisons of online and face to face modalities. Future work in this area could focus on determining what types of students are better served by online delivery and what types perform better in face to face instruction.

## Works cited

[1] R. Desai & E. Lord, "Comparison Of Web Courses With Traditional Teaching", Paper presented at 2002 Annual Conference, Montreal, Canada. 10.18260/1-2—10996, 2002

- [2] I. Orabi, "A Comparison Of Student Performance In An Online With Hybrid Based, Entry Level Engineering Course" Paper presented at 2004 Annual Conference, Salt Lake City, Utah. 10.18260/1-2—13147, 2004
- [3] G. Silcox, "Comparison Of Students' Performance In Online And Conventional Sections Of Engineering Thermodynamics" Paper presented at 2004 Annual Conference, Salt Lake City, Utah. 10.18260/1-2—12718, 2004
- [4] M. Semakula, "Learning Effectiveness In Online Vs. Traditional Courses" Paper presented at 2005 Annual Conference, Portland, Oregon. 10.18260/1-2—14734, 2005
- [5] A. Sergeyeve, & N. Alaraje, "Effectiveness of Traditional, Blended, and Online Teaching of Electrical Machinery Course" Paper presented at 2015 ASEE Annual Conference & Exposition, Seattle, Washington. 10.18260/p.23921, 2015
- [6] U.S. Department of Education, Office of Planning, Evaluation, and Policy Development, Evaluation of Evidence-Based Practices in Online Learning; A Meta-Analysis and Review of Online Learning Studies. Washington, D.C., 2010.
- [7] J. L. Hess, & L. G. Kisselburgh, & C. B. Zoltowski, A. O. & Brightman, "The Development of Ethical Reasoning: A Comparison of Online versus Hybrid Delivery Modes of Ethics Instruction" Paper presented at 2016 ASEE Annual Conference & Exposition, New Orleans, Louisiana. 10.18260/p.26125, 2016
- [8] K. E. Holbert, "Comparison of Traditional Face-to-Face and Online Student Performance in Two Online-Delivered Engineering Technical Electives" Paper presented at 2017 Pacific Southwest Section Meeting, Tempe, Arizona. <https://peer.asee.org/29208>, 2017
- [9] R. Zaurin, & S. D. Tirtha, & N. Eluru, N. "A Comparison between Mixed-Mode and Face-to-Face Instructional Delivery Approaches for Engineering Analysis: Statics." Paper presented at 2020 ASEE Virtual Annual Conference Content Access, Virtual On line. 10.18260/1-2—33985, 2020
- [10] P. Panindre, & R. S. Thorsen, "Assessment of Learning Effectiveness in Online and Face-to-Face Learning Environment for Engineering Education" Paper presented at 2020 ASEE Virtual Annual Conference Content Access, Virtual On line . 10.18260/1-2—34190, 2020