

Assessment of online teaching in Hood College's Department of Chemistry and Physics during
the Covid-19 pandemic

by

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Abstract

Following the March 2020 closure of the Hood College campus in the wake of the COVID-19 pandemic, there was a necessary switch to remote education. This switch caused upheaval across the Hood community, and there were a variety of responses to the shift in teaching modality. Using surveys given to both instructors and students, the impact of the shutdown—for both students and professors—was gauged to determine the success of remote education and any adjustments made for the following fall. Following the completion of the Fall 2020 semester, another survey was distributed to students with follow-up questions regarding their experiences with courses with respect to the modalities that the students chose, either in person or remote.

The surveys revealed students' and faculty members' struggles with adjusting to a remote format. They also provided some insight into things that could be done differently to address these problems. One response was to create contingency plans for the completion of in person laboratory assignments if the implementation of remote labs were necessary at any point during the semester. There are also indications from the survey results that more should be done in the interest of encouraging engagement from students attending classes remotely to better ensure their success.

Introduction

Remote education has been an option at institutions for many years, with investigations having been completed to examine their effectiveness as an educational medium in a typical academic setting. In one 2011 survey of both in-person and remote students, most respondents held neutral-to-positive view of online education. However, around one-third of those who had taken classes remotely held negative perceptions of the modality. Those with more online experience were more positive about attending courses remotely.¹ This would indicate that those who have chosen to be remote are more likely to succeed while receiving instruction in this manner, which

is supported by other studies.² Consequently, success in a remote course is related to the students' preference towards the modality as a means of receiving instruction, and those with remote educational experience were better able to engage with the course material.²⁻⁴

However, studies have also shown that there are higher rates of failure and withdrawal from online courses than those that are in person.^{4,5} These higher rates were determined to typically be from students who reported dissatisfaction with their enrollment in the remote courses. They were also noted to be participating less than those who completed the course. Another study also determined that both self-discipline on the part of the students and involved instruction from professors are necessary to succeed in an online course.⁶

In response to these observations, it had been recommended that core and other prerequisite courses not be taught remotely and that there should still be some physical, face-to-face component employed.² In the same vein, online classes were also recommended to be as analogous to the in-person version of the course as possible.⁵

In March 2020, in response to the COVID-19 pandemic, Hood College shut down the campus and made the transition to entirely virtual instruction. Courses were also required to be entirely asynchronous, and any synchronous component had to be optional. This was done so that with responsibilities brought on by the pandemic, students did not have to attend class at a set time. Students and faculty were given one week, in the form of an extended spring break, to get their affairs in order and ready themselves for this scenario. As such, there was a rush to get everything together for a completely new form of instruction that no one was prepared for. The timing also left many without access to their course materials and belongings, so students and professors had to rush to find alternatives.

Generally, professors switched their courses from synchronous, in person lectures to recordings of the lecture materials that were distributed to students. Labs for the rest of the semester were

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mostly online assignments that used data provided to the students by the professor, often from previous results for the activities. This approach for distributing course materials and assignments to students was also implemented in similar manners by other colleges that were shut down due to the pandemic.^{7,8} Both faculty members and students were thus forced to adjust to the change in setting and routine, on top of the uncertainty of the situation at large.

The impact on the Hood community caused by the shift to virtual instruction was thus investigated in a series of surveys. While online education has been studied extensively under typical circumstances, the impact of sweeping mandatory remote education has not been as well studied. These surveys were designed to gauge how individuals were impacted by the shift and their thoughts on both the transition to remote learning following the shutdown and the responses to it. This inquiry included surveys directed at students and faculty distributed following the Spring 2020 semester.

For courses taught during the Fall 2020 semester, it was decided in late July that students could return to campus. Professors were first given the opportunity to choose whether their classes would be synchronous, hybrid, or asynchronous, and if their courses were in person or remote. Students were then able to select their course modality to be either in person or remote for each of their classes, depending on what they felt was fit for them to do.

As a follow-up to the Spring 2020 surveys, a second student survey was distributed following the completion of the Fall 2020 semester. This survey asked questions that were adjusted to reflect the experiences of students who were either in person or online.

As was shown by the surveys, one of the most heavily impacted aspects of instruction in the chemistry and physics departments was the inability to carry out in person laboratory assignments following the transition to a virtual modality. In the interest of preventing this for the Fall 2020 semester, plans for labs that could be completed entirely virtually were established

as well. These plans, along with a report of the findings from the two surveys, were distributed to faculty members. The report communicated notable information from the survey as well as some recommendations of things that could be done to improve remote education in the event that it continued going forward.

Methods

Surveys

Three different surveys were written over the course of the investigation, the contents of which can be found in Appendix A.

The first survey was sent out in mid-June to all faculty and staff in the Hood College Department of Chemistry and Physics who taught at least one course during the Spring 2020 semester, including adjunct faculty. It asked questions regarding the professors' experiences with the switch to the remote modality following the closure of campus in March, including questions about the methods of instruction and assessment used before and after the shutdown and whether those methods were successful after the switch to remote education. There was a response rate of 100% (N=8).

Based on the results of the faculty survey, another survey was created and distributed to the 186 students who were in a Spring 2020 chemistry course. The survey was made available to students from July 20 to July 31 and the response rate was 24% (N=44). The survey asked many of the same questions as the faculty survey, only from the perspective of someone who was attending the class instead of teaching. This allowed a comparison between the student and faculty perspectives on the effectiveness of the remote teaching methods.

Another survey was offered to chemistry students following the completion of the Fall 2020 semester. There was a response rate of 28% (N=72) among the 260 students that received the survey. This survey asked similar questions as the previous one, although some were refined to

provide clearer, more useful answers to the questions. The survey also asked about the modalities chosen by each of the respondents for the chemistry classes they were enrolled in, either remote or in-person, including questions regarding their motivations for selecting a given modality and their ability to learn from them.

Remote Lab Plans

As the decision to reopen the campus for the Fall 2020 semester was not made until the end of July, there was uncertainty as to whether in person courses would be an option for much of the summer. To this end, plans were made to accommodate a scenario in which classes would be entirely remote. This included making lab plans that could be completed remotely, as that was one of the notable struggles from the Spring 2020 semester. The remote lab plans were constructed based on the activities found in the CHEM 101 (General Chemistry) and CHEM 100 (chemistry for non-majors) lab manuals. Activities that could be completed online or otherwise remotely were compiled into a list analogous to the contents of the lab manual to be employed as needed by professors. These activities would cover investigations that coincide with lecture materials as well as instruction in necessary lab skills for students.

To achieve this, web resources were found that could closely match either the lab activity itself or at least cover the learning objectives associated with the activity. For each lab, the learning objective was first listed. Then, an equivalent activity was located that could match the learning objective that was given. These activities were found by searching based on search terms related to the topic of the lab on different sites that contained resources for chemistry education.

Results and Discussion

Surveys

Faculty Survey: Spring 2020

Upon shifting to remote education, the college made it so that students could not be required to attend synchronous lectures by professors. This resulted in professors rushing to find alternate ways in which to provide instruction to their students and adjustments being made to their means of instruction. Methods such as written notes and audio or video recordings, primarily done via Blackboard Collaborate and uploaded to YouTube, were used to achieve this end.

As a mandatory, synchronous modality for classes was not allowed, the faculty survey revealed the move away from required synchronous lectures. As shown in Figure 1, roughly 60% of faculty members did not use synchronous lectures, while 40% offered optional synchronous class sessions.

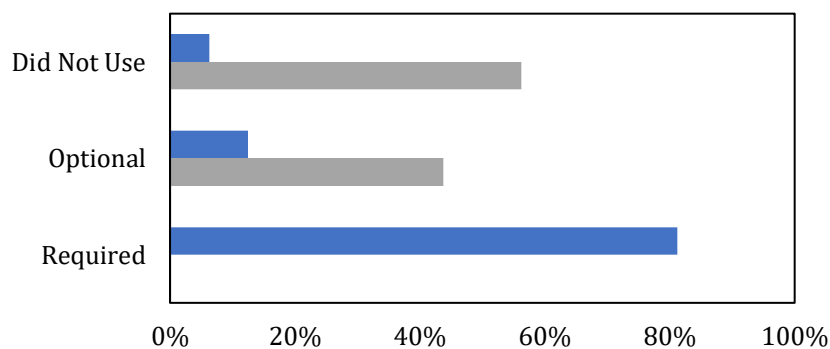


Figure 1. The use of synchronous class meetings before (blue) and after (grey) the shift to remote instruction, Spring 2020.

In response to this shift, professors instead moved to use different modes of asynchronous instruction, while some chose to hold optional synchronous sessions for those students who wanted to participate or interact with the professor. The synchronous class periods were instead replaced with required recorded lectures, either via audio or video recordings for students to access, as shown in Figures 2 and 3.

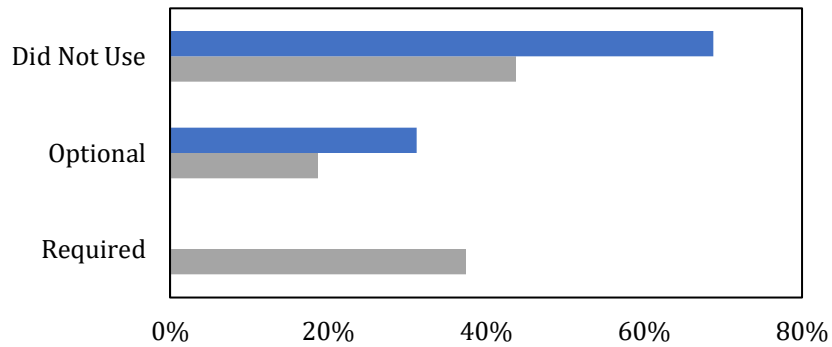


Figure 2. The use of audio lectures before (blue) and after (grey) the shift to remote instruction, Spring 2020.

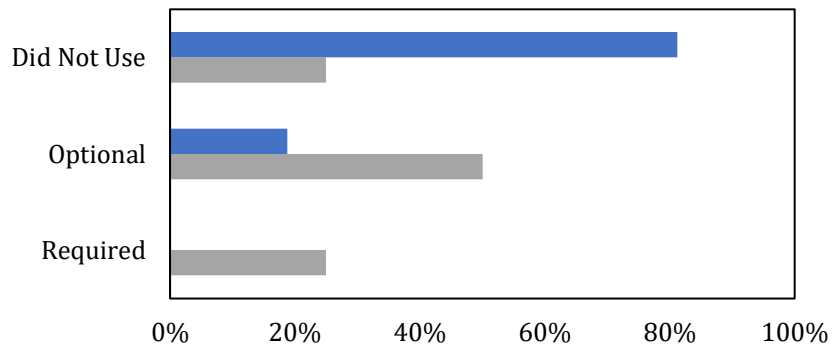


Figure 3. The use of video lectures before (blue) and after (grey) the shift to remote instruction, Spring 2020.

Reflecting the lack of in person—or indeed synchronous—class time, there was also a move away from in person lab sessions and assignments to activities online in their place. These remote activities had less success than those that had been completed while the students were still in person. Respondents described the labs as being “simply not very effective if you are not doing them in person” and that the “number of completed labs dropped significantly by the end of the semester.”

Professors also noticed a sharp decline in student engagement with their course materials, and many also struggled following the shift to virtual, often asynchronous, instruction. For example, one respondent wrote that “the lack of in-person meetings led one student to struggle; I emailed her but if we had been face-to-face I think we would have better resolved her struggle and she

would have done better.” The problem of engagement was also reflected in the lack of students accessing some course material and failing to complete assignments satisfactorily. On this topic, another respondent noted that in a class with optional synchronous class time the “video recordings of the classes were available, but they were rarely watched.”

There was also a shift away from the implementation of group assignments in classes, as shown in Figure 4.

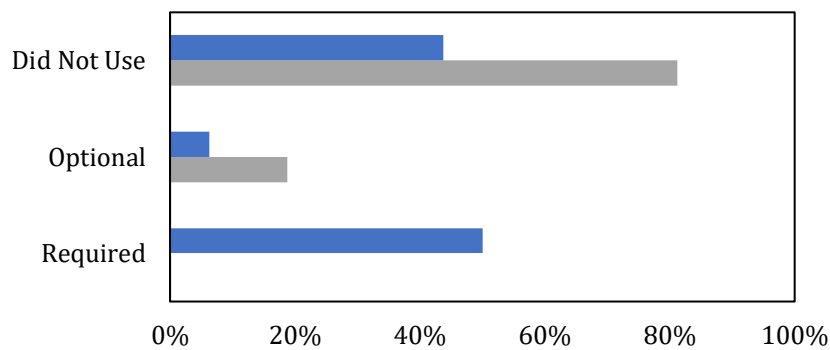


Figure 4. The use of group labs and projects before (blue) and after (grey) the shift to remote instruction, Spring 2020.

The lack of required group projects while learning remotely also contributed to the lack of engagement among students. With no group work being done, there was a loss of another means of interaction for the students during which they could better their understanding of the material by working together.

There were also many problems with academic integrity observed by professors over the course of the Spring 2020 semester. Students were cheating on assignments in ways that were obvious when grading them, and in some cases the students were doing so frequently. Students were violating the Honor Code in ways such as collaborating on quizzes and tests. As one respondent reported, “On the first quiz after moving to online education, I saw substantial evidence that people were using resources they should not have been (and possibly working together)...On the exam the next week, three students clearly had worked together.”

Students were also violating the Honor Code by using online resources to find the answers to questions. One respondent wrote “it was clear to me that the internet was being used to answer at least one question as the words given by students in their answers were never words we ever used in class but can easily be found online.” Another noted the use of the website Chegg to get answers to test questions, saying that they “think some students used online tools like Chegg to find solutions to test problems. Even modifying my questions, there are still many similar problems in Chegg.”

These problems indicate that adjustments would need to be made to how the course materials are given to students and how to properly engage the students while they are remote. They also show that there needs to be some way to proctor exams that prevents problems with academic integrity. One way of addressing this in the Fall 2020 semester was to have remote students take their exams while on Zoom to ensure that there were no violations occurring.

Student Survey: Spring 2020

For the survey given to Hood students taking courses in the Department of Chemistry and Physics following the Spring 2020 semester, the respondents were asked about which instructional methods they missed using following the move to remote instruction. Respondents missed the in-person elements of instruction and the interaction that is associated with them. For example, one respondent wrote “With interactive in-person labs being replaced by pre-recorded simulations of the lab activities, I found that it was more difficult to keep up and apply what was being taught in lecture to the lab because we were simply watching a lab be performed and not problem solving through it ourselves.”

On the other hand, students were also asked which teaching methods that were continued students felt should have been discontinued instead. One method listed was the assignment of lab activities to be completed remotely. To this end, one respondent said that “labs were difficult

but not impossible; therefore, it was okay but not the greatest experience.” Respondents also noted that remote assessments should have been modeled on a different format than that used before the shift the remote education. The use of timed, closed-note tests and quizzes was also found to be less feasible while remote than when in person, with a respondent writing that “we should have been allowed to use our notes due to the inability to ensure that all students were being fair and were trustworthy. No way to effectively regulate a closed-note test.”

Respondents were also asked their thoughts on the effectiveness of instructional methods kept by professors following the transition to remote courses, as reported in Figure 5.

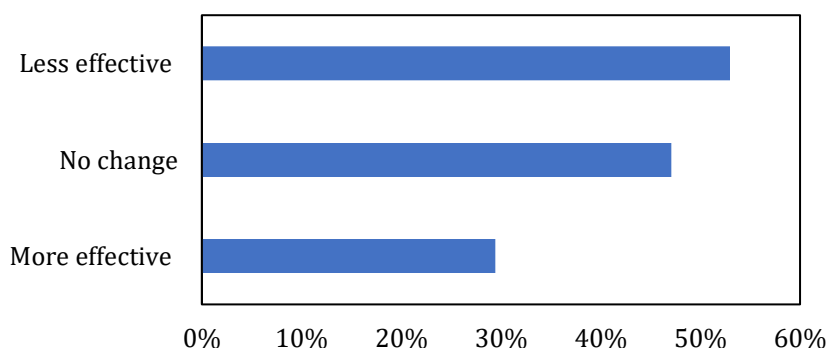


Figure 5. Change in effectiveness of instructional methods maintained by professors after becoming remote, Spring 2020.

Instructional methods that remained throughout were generally considered less effective to at least some degree when used in a remote format. This loss of effectiveness for students was likely due to the fact that these instructional methods were intended for a more structured, interactive setting than the remote, asynchronous format could provide.

When asked about the efficacy of any new instructional methods adopted by instructors following the shift to remote education, students responded as seen in Figure 6.

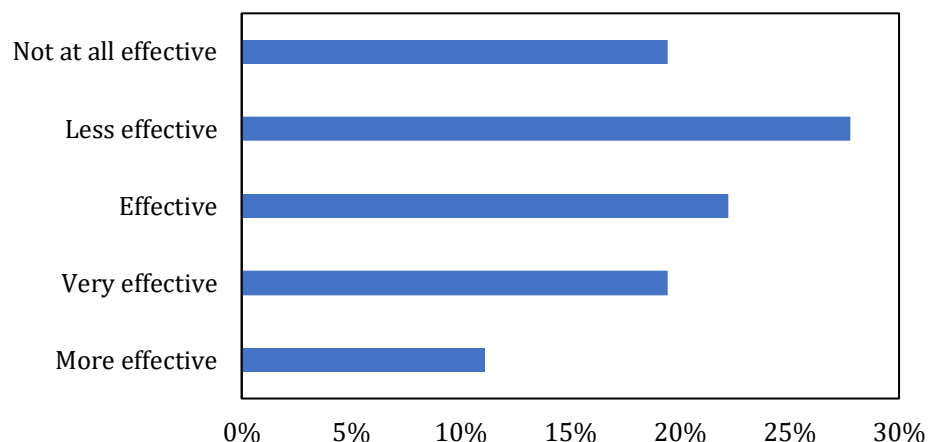


Figure 6. Effectiveness of new instructional methods employed after the shift to remote instruction, Spring 2020.

The responses indicate that the methods introduced while teaching remotely were also found to be not particularly effective methods of instruction, with nearly half of respondents reporting that the methods were somehow less effective for them.

Many of the positive comments from respondents regarding effectiveness were directed at the recorded lectures, which could be viewed later and at the students' own pace. As one respondent noted, "added video lectures were very effective because I could go at my own pace." Meanwhile, most of the criticism was given to lab assignments and difficulties with the asynchronous nature of most of the classes in general. On this topic a respondent said, "online labs are only moderately effective, and virtual lectures lack the necessary engagement required for optimal learning." Comments also mentioned a lack of available tutoring over this period and that it would have been beneficial to have as a resource, such as that, "it was hard to grasp specific chemistry topics with the video presentations; maybe there should have been online tutors."

Students were also asked their thoughts on the value of synchronous and asynchronous course modalities, as shown in Figure 7.

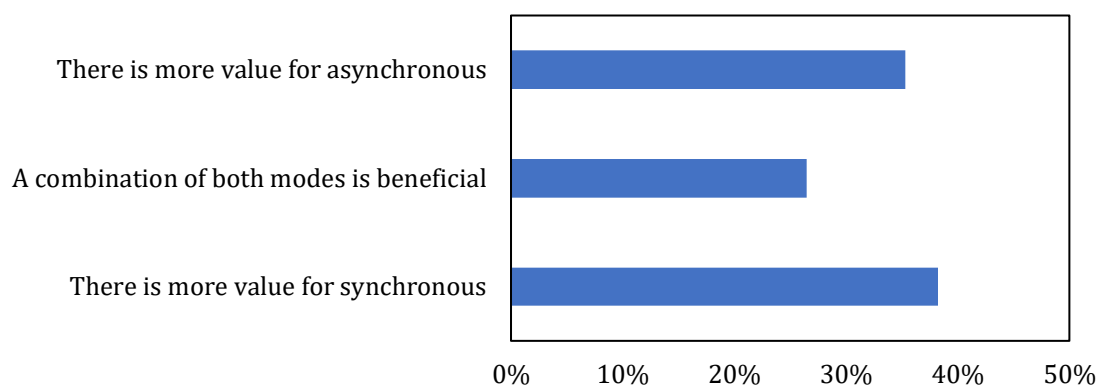


Figure 7. Thoughts on the value of synchronous and asynchronous courses, Spring 2020.

There was a fairly even split between the respondents who found value in each of the modalities, as well as some who saw value in a combination of both modes. Asynchronous lectures were valued due to the ability for students to learn the material at their own pace instead of the pace dictated by the professor, and recorded lectures were considered valuable by respondents no matter what modality they found more value for.

There were also a variety of difficulties that were experienced by respondents, reported in Figure 8.

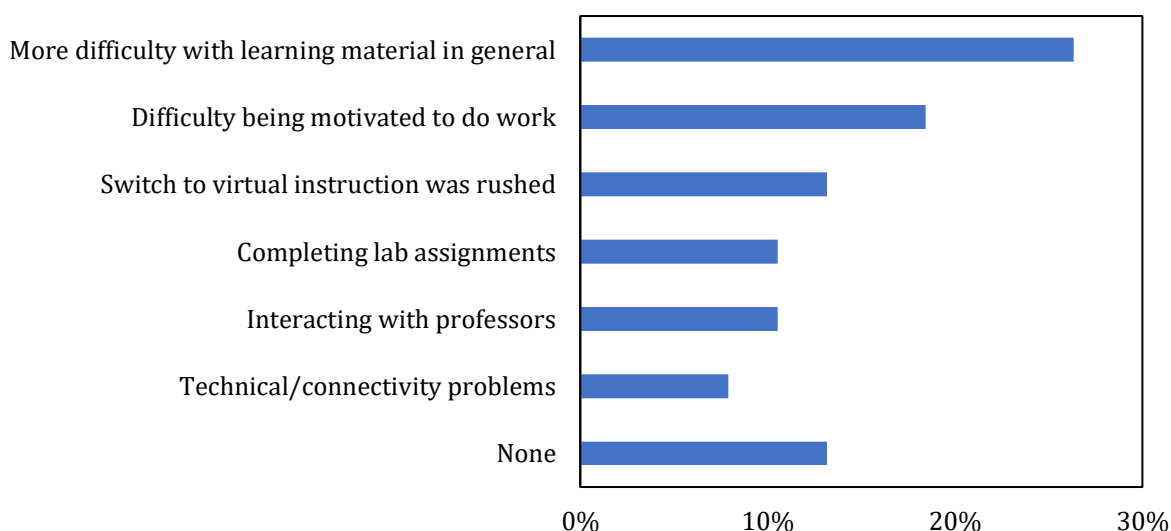


Figure 8. Difficulties experienced by students following the shift to remote instruction, Spring 2020.

The respondents most frequently reported difficulty with learning the course material in general, which relates back to the respondents' struggles with the instructional methods and that they were found to be less effective. Similarly, respondents found staying motivated difficult while completing the courses remotely. Lab assignments and their associated difficulties also appeared yet again as a difficult place for students that should thus be addressed for the following semester. There were also problems with the short amount of time in which everyone—students and faculty—had to adjust and create a plan for going forward. This resulted in the execution of the shift being noticeably rushed. Technical problems also occurred over this time, which also provided problems with the ability to access and complete course materials.

In response to this information, it was determined that there should be an effort made to find better solutions for remote lab activities, as well as ways for students to be engaged with the material. Comments regarding these topics appeared on both the student and faculty surveys, which indicates that they are of note to both the students and instructors. The multiple positive comments regarding lecture recordings by respondents also indicate that there is value to these recordings and that they should be continued in the future.

Student Survey: Fall 2020

During the Fall 2020 semester, the campus had reopened, and students and faculty were given the opportunity to choose their modality for their courses. Another survey was sent out following the Fall 2020 semester to students taking courses in the Department of Chemistry and Physics.

The respondents were asked what percentage of time that they were attending classes in person. As shown in Figure 9, 20% of students attended their classes entirely online, with the rest of the students attending at least part of the time in person. Of those students, about 30% of students were in person 81-100% of the time.

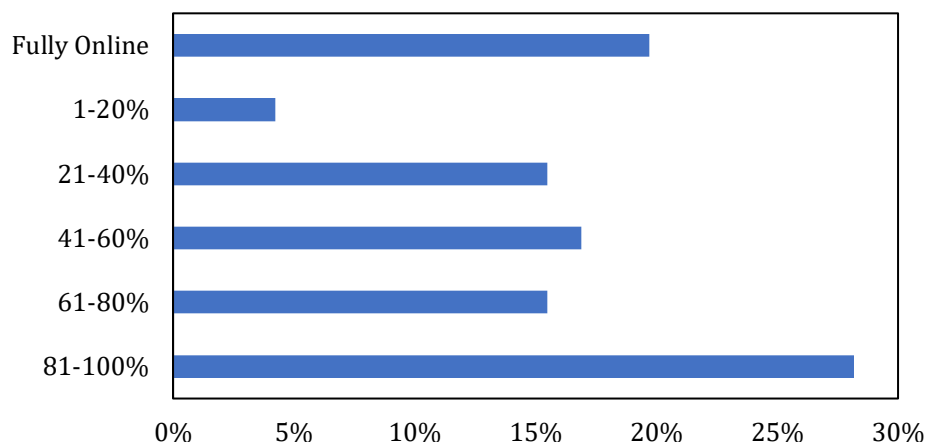


Figure 9. Percentage of classes students are attending in-person, Fall 2020.

For those respondents that attended any number of classes in person, most respondents did so because they found it easier to learn the material or engage with the class when physically present. Respondents wrote comments such as “I did it to attempt to make it better for me to retain the information” and “I learn better in person face-to-face with the content and lab materials.” Respondents also gave the need to participate in labs as a primary reason that they selected this modality. One noted that the “class is a lab and it is required to get a good understanding of the material; same goes for the lecture,” while another said, “CHEMXXX was a lab and the professor encouraged me to take it in person.”

Respondents also gave several responses to explain their motivation for learning remotely during the semester. The bulk of these were due to concerns about potential exposure to COVID-19 or due to the convenience of remote attendance. For example, a respondent wrote “I’m at-risk for contracting COVID-19, and would like to stay and safe as possible,” and a second respondent attended remotely “either because I was not on campus and or I woke up late.” Some of the courses were also either held either entirely remotely or had alternating days in which portions of the class were in person while the rest attended remotely.

There were again many compliments directed towards the benefits of the recorded lectures and being able to access them on demand to review the covered material at a later time and a better pace for the respondent. One student who found the recorded lectures beneficial responded “I really enjoyed being able to rewatch lectures as a study tool. If I had trouble understanding it or noticed that something was missing in my notes, I could just go back and rewatch it.”

Respondents were also glad to be back in person, especially for lab, as it had been shown that online labs were considered ineffective by comparison. Some comments to this effect were “I found the in-person lectures a lot more effective than the online lectures, not actually being in class kind of made it harder to focus and take notes” and “the in lab teaching method was helpful for me to understand the material in a hands on way.”

The survey also asked about the participation of respondents who attended their classes remotely, which is reported in Figure 10.

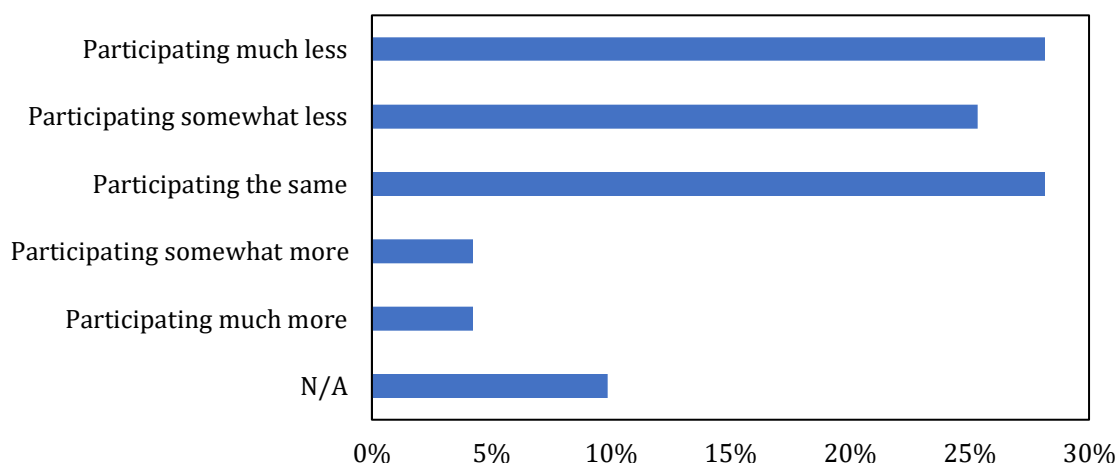


Figure 10. Participation of students attending courses remotely, Fall 2020.

Respondents felt that they had mostly participated either the same as they would have in person or in some capacity less than they would have in person. This would again provide evidence of difficulties with engagement for remote students due to interaction with the class being more difficult than if they were in person.

When the remote participation is broken down by the different percentages that students attended class in person, as shown in Figure 11, this shows different trends in remote participation.

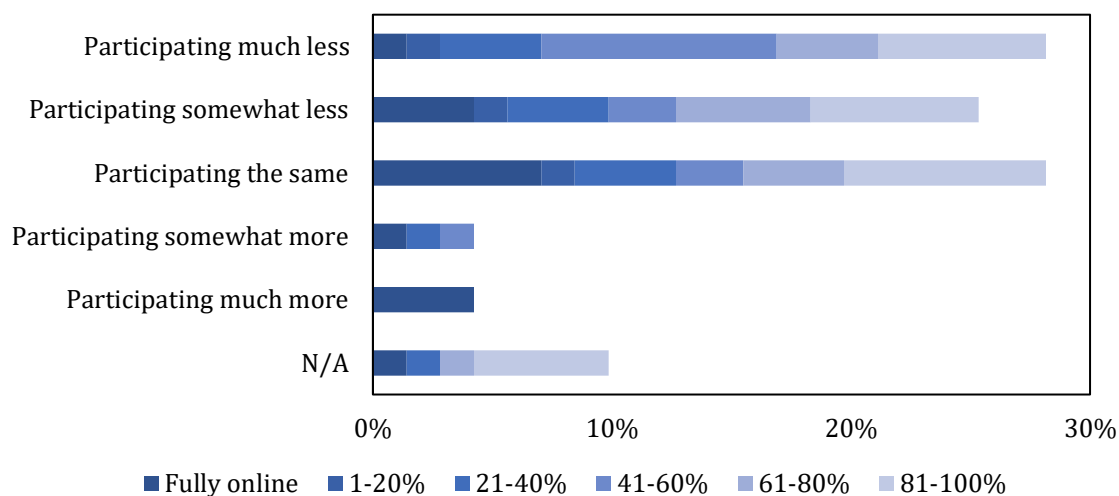


Figure 11. Participation of students attending classes remotely depending on the percentage of classes attended in person, Fall 2020.

These results show there are fewer entirely remote respondents who found that they were participating less than if they were in person. They also indicate that those who struggled more with participation while remote were the respondents who were only remote a portion of the time. This would suggest that most students made appropriate decisions regarding their chosen modality to best succeed in the courses that they took.

In a similar vein, all of the remote respondents were asked about their comprehension of the lecture material in their courses when attending remotely, which is shown in Figure 12.

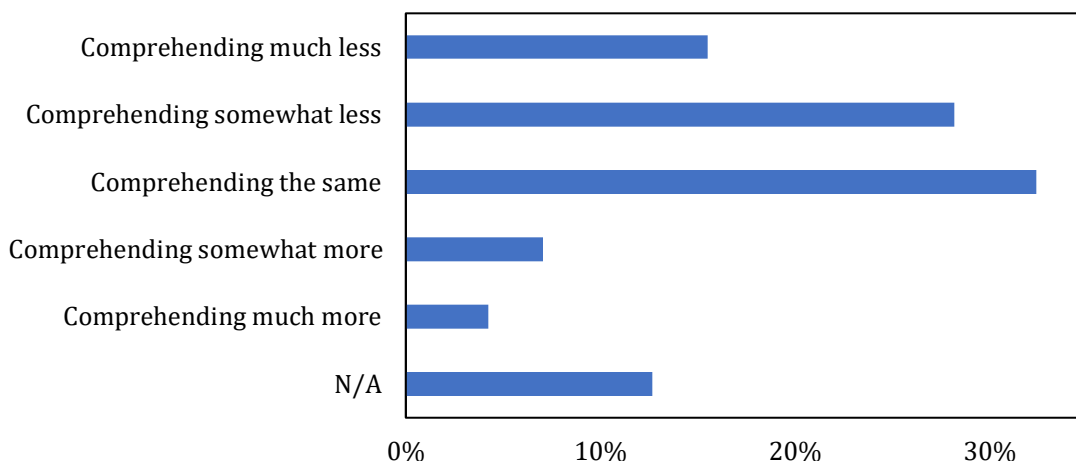


Figure 12. Comprehension of material for students attending courses remotely, Fall 2020.

The respondents were, similar to the participation question, comprehending either the same or less than if they were in person. This is likely correlated with the reduced participation reported above for overall remote attendees.

The breakdown of the remote comprehension data depending on the amount of time spent in person also displays similar trends the distribution of remote participation responses, as seen in Figure 13.

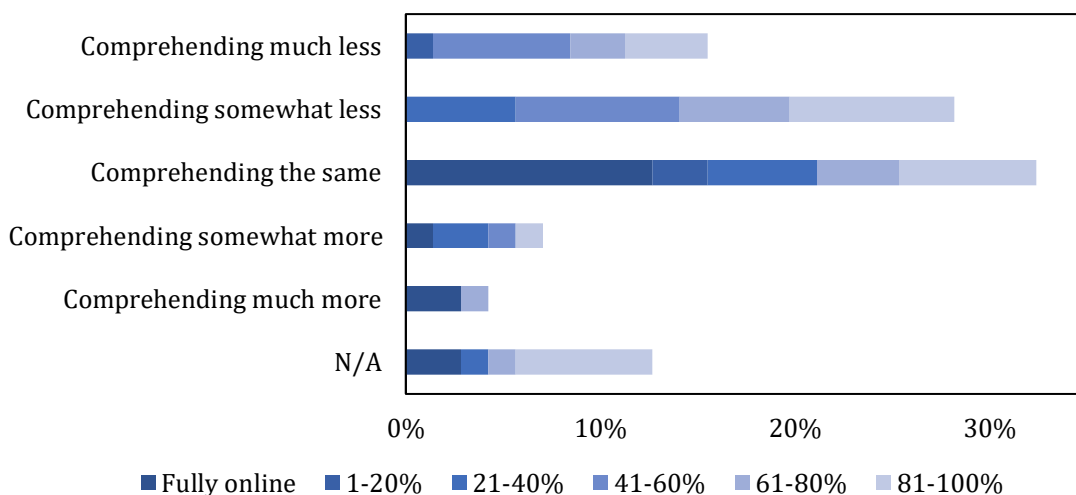


Figure 13. Comprehension of material for students attending courses remotely depending on the percentage of classes attended in person, Fall 2020.

Each of the respondents who were fully online reported comprehending at least the same, and in some cases comprehending more, than if they were to be in person. This again correlates with the participation ratings from the fully online students. Those who comprehended less while attending remotely were generally those who attended most of their classes in person. It also indicates that these students selected a modality that would benefit them and that the respondents felt they could succeed while remote.

The N/A option for Figure 10 through Figure 13 was intended to be used as an attended fully in person option on the survey. However, not all of the respondents selected the option under this assumption.

These responses indicate that the remote students, though still not participating to the extent of the in-person students, at least considered themselves to be somewhat successful in their courses. The continued support for lecture recordings also suggests that the practice is something that should continue even after COVID-19 protocols are no longer in place. It is something that has been very positively viewed by the majority of the respondents as beneficial to their retention of information.

Remote Lab Plans

To address the lack of satisfaction that occurred with the implementation of remote labs in the Spring 2020 semester, remote lab plans for 100-level chemistry classes were created. In doing this, some limitations had to be worked around. For example, there is no way to distribute lab materials to all of the remote students. Lab kits cannot be provided by the college to every remote student who would require one and making the students purchase the lab kits themselves would be expensive for them.

Instead, these plans covered material adapted from the typical in-person lab sessions during the course to be completed online. These would meet the objectives taught by the labs as well as the lab skills that would be usually developed during these assignments.

Using the existing lab manual and learning objectives, activities for each of the assignments were obtained. After locating online activities that could correspond to each of the labs, or that otherwise relate to the learning objectives covered, these were compiled into a list that could be utilized by any chemistry professors who may need it. This would be mostly if remote instruction became necessary due to a high rate of COVID-19 infection on campus or that students had opted for a fully remote modality and accessing the lab in any notable capacity would be impossible.

The lab plans were distributed to the professors for these courses, which gave them lab materials that could be assigned for students to complete. The semester was successful enough, though, that any prolonged moves to totally remote instruction were not required so, these plans were not put into use in any notable capacity over the Fall 2020 semester. The classes were also structured such that it was feasible to primarily have lab periods in an in-person format for these courses. This left these plans as a useful, yet ultimately unnecessary, contingency plan available for the semester.

Conclusions

Both students and faculty found the shift to remote instruction during the Spring 2020 semester challenging. There was a lack of preparedness all around when it came to the campus shutting down, which was not helped by the rushed nature of the transition. Partially due to the rushed nature of the remote course materials that were created, as well as the adjustment required to learning in a new environment that may not be as conducive to comprehending material, most students overall found it a less effective way to receive instruction. Students also could not easily go to a professor with questions or collaborate with peers on the material.

One major theme was the dissatisfaction with the online lab activities that were assigned following the shift to remote instruction. Students felt these were not helpful for adequately learning the material as they would have in person. To this end, remote lab plans were developed to provide potentially more engaging, useful assignments to complete.

Honor Code violations from the Spring 2020 semester also increased significantly following the shift to remote instruction, with students working together and utilizing online resources to complete individual assessments. As such, in the Fall 2020 semester remote students took their exams while on Zoom to ensure that there were no violations occurring.

For the Fall 2020 semester, students had the opportunity to return to campus if they wanted to. This proved beneficial to those students who found themselves to be unsuccessful in a remote environment. However, there was still difficulty for some students who had opted to remain remote for at least some of their courses. These results indicate that the remote modality does make engagement somewhat more difficult and would suggest there is a need to encourage participation from remote learners. This could be done through assignments based off of the lecture for the day or making sure to involve the remote students in class discussions with their in-person peers.

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Appendix A
Surveys
Faculty Survey

1. How many unique classes and labs did you teach this semester? For the purposes of this question, please count separate lecture and lab classes separately, even if they have the same course number, but combined lecture/lab courses should be counted as a single course (CHEM 210 and CHEM 210L would be counted as two classes, but CHEM 102 would only count as a single course).

___ (number field)

2. For the first class you taught this semester, was this class a lecture course, a lab course, or a combine lecture/lab course?

Check boxes

- ☐ Lecture
- ☐ Lab
- ☐ Combined Lecture/Lab
- ☐ N/A (I did not teach a course) – if this option is selected, questions 3-8 should not appear).

3. For the first class you taught this semester, what was the intended level of the course?

Check boxes

- ☐ 100-level
- ☐ 200-level
- ☐ 300/400-level
- ☐ 400/500-level
- ☐ 500-level

4. For the first class you taught this semester, please identify the teaching and assessment methods that you used in the course. Please check whether the method was required or optional before the move to online education and/or after the move to online education. Please check all that apply. If you used a teaching or assessment method not listed, please list it under other.

Check box fields for each method

Method	Required Before Online Education Started	Optional Before Online Education Started	Required After Online Education Started	Optional After Online Education Started
Live (synchronous) lectures				
Audio lectures recorded by you				
Video lectures recorded by you				
Audio lectures by someone else				
Video lectures by someone else				
Text-based lecture notes				
Textbook readings				
Readings from websites				

Readings from journal articles				
Other readings				
Textbook problems				
Other homework problems				
Daily or weekly quizzes				
Open book or note exams				
Closed book or note exams				
Informal writing assignments				
Formal writing assignments				
Oral presentations				
Poster presentations				
In-person labs				
Online labs				
At-home labs (e.g. kitchen chemistry)				
Simulations				
Computational models				
Lab data sheets				
Group labs/projects				
Other 1				
Other 2				
Other 3				
Other 4				
Other 5				
Other 6				
Other 7				

5. For any methods that you discontinued after the move to online education, what was your rationale for doing so? Did your experience match your expectations with these methods?

6. For any methods that you added after the move to online education, what was your rationale for doing so? Did your experience match your expectations with these methods?

7. Of the above teaching methods that you used, did you observe any changes in how effective they were after the move to online education?

8. One thing that has come up more this past semester with the switch to online education has been issues related to the Honor Code. What issues, if any, arose with the honor code in this class?

Questions 2-8 would be repeated 5 times, to accommodate as many classes as one person is likely to have taught (ideally, the number of times these questions show up would be tied to their answer to question 1, but I'm not sure that is technically feasible).

9. What suggestions do you have for strengthening the Honor Code while implementing online education and ensuring that students abide by instructions related to unauthorized aid on assignments, quizzes, and exams?

10. Another question that has come up relates to the feasibility and value of synchronous versus asynchronous classes. What comments do you have on the value of synchronous versus asynchronous classes for our students?

Spring 2020 Student Survey

1. How many chemistry and physics classes and labs did you take this semester? For the purposes of this question, please count separate lecture and lab classes separately, even if they have the same course number, but combined lecture/lab courses should be counted as a single course (CHEM 210 and CHEM 210L would be counted as two classes, but CHEM 102 would only count as a single course).

- ☐ 100-level
☐ 200-level
☐ 300-level
☐ 400-level

2. Please identify the teaching and assessment methods that you used in the course. Please check whether the method was required or optional before the move to online education and/or after the move to online education. Please check all that apply. If you used a teaching or assessment method not listed, please list it under other.

Check box fields for each method

Method	Required Before Online Education Started	Optional Before Online Education Started	Required After Online Education Started	Optional After Online Education Started
Live (synchronous) lectures				
Audio lectures recorded by your professor				
Video lectures recorded by your professor				
Audio lectures by someone else				
Video lectures by someone else				
Text-based lecture notes				
Textbook readings				
Readings from websites				
Readings from journal articles				
Other readings				
Textbook problems				
Other homework problems				

Daily or weekly quizzes				
Open book or note exams				
Closed book or note exams				
Informal writing assignments				
Formal writing assignments				
Oral presentations				
Poster presentations				
In-person labs				
Online labs				
At-home labs (e.g. kitchen chemistry)				
Simulations				
Computational models				
Lab data sheets				
Group labs/projects				
Other 1				
Other 2				
Other 3				
Other 4				
Other 5				
Other 6				
Other 7				

3. Some teaching methods were discontinued with the move to online education. For any of the methods that were no longer used, were there any that you missed having?
4. Were there any teaching methods that were not discontinued that you think should have been?
5. For any methods that your professor added after the move to online education, how effective did you find them compared to those that were used before the switch?
-
6. Of the above teaching methods that your professor continued to use, did you observe any changes in how effective they were after the move to online education?
7. What comments do you have on the value of synchronous classes (where all students are together at the same time) versus asynchronous classes (where lectures are recorded and can be watched at any time)?
8. What was your experience with the Honor Code, since the move to online education? Did anything change after the move to online education?

9. What, if any, difficulties (or any other concerns that had arisen for you) with the implementation of online education did you come across following the shift?
10. Do you have any additional comments for your professors to consider as they plan for the fall semester?

Fall 2020 Student Survey

1. How many chemistry and physics classes and labs did you take this semester? For the purposes of this question, please count separate lecture and lab classes separately, even if they have the same course number, but combined lecture/lab courses should be counted as a single course (CHEM 209 and CHEM 209L would be counted as two classes, but CHEM 101 would only count as a single course).
 - a. ☐ 100
 - b. ☐ 200
 - c. ☐ 300
 - d. ☐ 400
2. Roughly what percentage of the time are you attending class in person?
 - a. I am attending entirely online
 - b. 1-20%
 - c. 21-40%
 - d. 41-60%
 - e. 61-80%
 - f. 81-100%
3. What are your reasons for attending class in person, when you choose to do so?
4. What are your reasons for attending class virtually, when you choose to do so?
5. Please identify the teaching and assessment methods that you used in the course during the semester.

Method	Required	Optional
Live (synchronous) lectures		
Audio lectures recorded by your professor		
Video lectures recorded by your professor		
Audio lectures by someone else		
Video lectures by someone else		
Text-based lecture notes		
Textbook readings		
Readings from websites		
Readings from journal articles		
Other readings		
Textbook problems		
Other homework problems		
Daily or weekly quizzes		

Open book or note exams		
Closed book or note exams		
Informal writing assignments		
Formal writing assignments		
Oral presentations		
Poster presentations		
In-person labs		
Online labs		
At-home labs (e.g. kitchen chemistry)		
Simulations		
Computational models		
Lab data sheets		
Group labs/projects		
Other 1		
Other 2		
Other 3		
Other 4		
Other 5		
Other 6		
Other 7		

6. Were there any methods that you have found particularly effective/ineffective this semester?

7. For classes you attended remotely, how would you rate your level of participation or engagement compared to in person?

- Participating much more remotely than when in person
- Participating somewhat more remotely than when in person
- Participating about the same
- Participating somewhat less remotely than when in person
- Participating much less remotely than when in person
- N/A

8. For classes you attended remotely, how do you feel about your comprehension of material compared to in person?

- Comprehending much more remotely than when in person
- Comprehending somewhat more remotely than when in person
- Comprehending about the same
- Comprehending somewhat less remotely than when in person
- Comprehending much less remotely than when in person
- N/A

9. What additional comments do you have for your professors to consider as they plan for the spring semester?