Report of the Subcommittee on Effective Online Delivery

1. Critical Tools for remote teaching

Transitioning the almost 2,300 courses to remote instruction in the spring semester identified the two most critical tools required, Canvas and Zoom, and provided the university with the opportunity to build expertise at scale. Canvas is a cloud-based learning management system that allows instructors to manage a wide range of course support including digital materials distribution, assignments, integrated course calendars, communications between faculty, course assistants and students, grading, and other aspects of instruction. Zoom is a web and video conferencing service that provides a platform for remote course instruction including synchronous live sessions that can be recorded and viewed by students; the tool includes online meetings and webinars, polling, breakout rooms, etc. Panopto also proved to be extremely useful as an excellent recording platform for asynchronous content delivery.

The Center for Teaching Innovation (CTI) and Cornell Information Technology (CIT), together with CU Library Services, Student Disability Services (SDS), eCornell, Learning Strategies Center (LSC) and other units have prepared materials and help desks to support instructors and students both with these tools, and with pedagogical changes required for the remote instruction. CIT also increased VPN capacity and worked with Zoom to improve privacy settings.

Canvas and Zoom saw unprecedented usage after April 6th and were able to sustain Cornell classes without major interruptions. Note that 30% of spring semester instructors had not used Canvas prior to April 6th, and an even higher percentage of instructors had not used Zoom.

During a typical teaching day we saw:

- Over 7,000 Zoom meeting sessions (classes and other meetings)
- Around 100,000 Zoom participants per day
- Around 1,000 Zoom recordings
- Around a million Canvas actions taken (students opening course materials, participating in quizzes, etc)

CIT reports that Zoom has been a very responsive company to work with. For example, Zoom increased the allowable number of large Cornell meetings (1,000 attendees or more) at no additional cost.

Of the immense number of Zoom sessions (teaching and all other sessions since April 2020), Cornell only experienced 4 “Zoom bombing incidents” and these were due to various simple setup errors by the hosts. CIT and CTA invested a great deal of effort in outreach and training to help avoid these problems. In addition, Zoom made several important modifications to the application to make it easier to ensure privacy with better controls around screen sharing, improving encryption, and requiring passwords for all sessions. Finally, Cornell IT reviewed our contract with Zoom leadership ensuring privacy rules and safe data storage requirements were being met.

For the fall semester and beyond, we believe that Zoom continues to be the most robust, safe and appropriate video teleconferencing platform for Cornell. All of our peer institutions (as far as we know at this point) are planning to continue using Zoom as well. We know of one partner institution that has switched from another platform to Zoom. Based on the experience in the spring, there is high
confidence that these tools will have the capacity and structure to support the entire fall curriculum if it is necessary to be completely remote (no in-person instruction). We acknowledge that there are concerns with Zoom’s privacy policies for international meetings. Please see for example this link: https://blog.zoom.us/wordpress/2020/06/11/improving-our-policies-as-we-continue-to-enable-global-collaboration/

Given the variety of technology challenges delivering international content, especially those which censor content, CIT will continuously monitor and investigate potential alternative solutions. CTI will develop teaching related resources and share details on the CTI webpage when alternatives become available via the CIT vetting process.

**Recommendation:** Zoom should be continued as the video teleconferencing platform for Cornell. In addition, we recommend that more instructors consider the use of Panopto as a recording platform for asynchronous content delivery.

2. Pedagogy and course design for remote teaching

CTI provided critical support for instructors moving to remote teaching during the spring semester. CTI’s capacity was stretched thin: the unit quickly developed “around the clock support” structures, evening shifts, and scaled support through live and recorded webinars (in addition to more personalized consultations). Recorded webinars were accessed more than 2500 times. Topics in order of popularity were: “Getting started Moving Online”, “Getting started in Canvas”, “Using Zoom for Teaching Online”, “Using Panopto for Creating and Sharing Video Online”, “Polling for Online Classes”, “Online Assessment”, “Inclusion, Accessibility and Accommodations in Online Learning”. In surveys, 94% (77/82) of respondents indicated that participation in CTI webinars to support remote teaching was a good use of their time.

Live webinars had a total of 545 participants. In addition, another 439 instructors participated in departmental or college trainings. The “drop-in office hours” were used by 573 instructors. 2228 support tickets were answered by CTI staff.

eCornell instructional designers and library staff provided additional support and expertise. CIT significantly ramped up Zoom support and answered an additional ~2000 questions related to Zoom.

Feedback is being collected now to help us better understand any challenges faced by faculty and students during the exigent circumstances created by the onset of Covid-19 and the campus being closed due to state mandate.

Guidance for instructors who will be teaching completely remote classes (no in-person component) is based on the spring semester experience and student feedback. Instructors will be asked to structure course materials such that, at a minimum, (quoting from the Provost message to instructors from May 27th, 2020) they meet the following:

- shorter video lectures are pre-recorded and uploaded for students in advance
- instructors communicate regularly and clearly about what is required versus optional material
- a sense of course community is created, and frequent opportunities for instructor/student engagement are presented (including for students in different time zones)
• course materials are accessible to all students (see also section 4)

Implicit in these requirements is the need to provide sufficient opportunities for the “substantive interaction” that is central to the Cornell experience. The nature and hours of such interactions will vary widely depending on the course content but should be assured in any completely remote structure.

Faculty will need to work with their colleagues and the Center for Teaching Innovation (CTI) to design course components that may not translate easily to an online format, including traditional timed exams (see also section 3).

We would like to stress that successfully reconstructing courses for this new format and environment will be challenging, and that considerable preparation time will be required to achieve these goals. We note that while these instructions have elements of good online design, these classes do not have to be “online” classes in the classic sense of a completely self-paced high-production online course such as produced by eCornell, for example.

We believe that communication about these expectations, and support for instructors has to happen at several levels, including at the departmental, college, and university level. Department Chairs should be clear as they discuss expectations with faculty, CTI resources should be clearly structured to help with each of the goals, and opportunities at college and university level for support and discussion should be publicized.

We note that due to scheduling and load factors, a significant number of instructors did not have a course scheduled this past semester. The estimate is that 25% of the faculty scheduled to teach this fall did not teach this spring. They do not have experience teaching with Zoom and some percent of these may also have little or no familiarity with Canvas. These faculty will need to recognize their special training need and prepare as soon as possible for the transition to remote and online teaching in the fall. Resources prepared by CTI for the spring semester move to remote teaching can help them begin. We also expect that, among faculty who did have a course assignment this past semester, many will want more guidance or training to better prepare for their fall semester teaching.

The Center for Teaching Innovation is preparing accelerated training and resources to support fall instructors through:
• lessons learned from the spring experience,
• online workshops on course development for remote delivery
• resources dedicated to online assessment, creating inclusive online learning environments, engaging students, etc.,
• consultations with instructional designers to walk through course planning,
• online drop-in hours, and
• departmental or college-based workshops

Adding to that, CTI plans to offer a 2-week curriculum for remote course design that will be offered repeatedly throughout the summer.

Instructors involved in the Active Learning Initiative adapted active learning strategies to remote courses of different sizes. Guidance, challenges, examples, and lessons learned can be found in this [document](#).
Recommendation: Clear communication about expectations, and support for instructors has to happen at several levels, including at the departmental, college, and university level. Continue increased support efforts including eCornell/library and supplement those efforts by facilitating faculty meetings over the summer to exchange ideas, develop recommendations for critical elements that may be discipline-specific, such as assessments.

3. Addressing Academic Integrity in a remote teaching environment:

Anecdotal evidence suggests that incidents of academic integrity this past semester were more widespread than we have seen in the recent past. For example, in one “gateway” large enrollment class there seems to be compelling evidence that more than 100 students violated AI on one exam. This was likely due to a combination of increased pressure during a difficult situation and increased availability of cheating options in online settings where proctors and other oversight was absent. For example, services such as Chegg allows students to share their exams and get answers from other people in real time.

Going forward it is likely this will be an issue in the fall semester in both the all online and remote teaching environments. Given the magnitude, University Academic Integrity Hearing Board protocols cannot handle the potential flood of cases. This begs the question as to how best to manage the problem proactively. Possible solutions include:

- Have more frequent less “high stakes” deliverables
- Limit the open time horizon on deliverables
- Have exam questions that are randomly assigned from a bank of similar questions throughout the exam
- Online proctoring
- Continuation of S/U grading option with the addition of “qualifying exams” for highly demanded majors

Each of these options has pros and cons. It would be difficult to ask faculty to follow one modality and instead we should make Deans, ADAAs, Dept. Chairs and all faculty aware of the issues and provide the alternatives listed above for their consideration. We believe the best path is for a local solution to be agreed to for faculty within their respective departments that aligns with the University’s AIHB codes, codes of conduct, and privacy rights.

Recommendation: Since the best solutions for preventing academic integrity problems vary with the course setting, size, and material, we recommend that the decision about how to adapt courses be left to faculty, in consultation with their departments. In order to assist faculty with the decision, we recommend that the ongoing effort to develop guidance for faculty about the options be continued, perhaps through the Dean of Faculty Office. CTI can serve in a supportive function, working with faculty to investigate additional tools that may be needed (such as online proctoring solutions or additional Canvas exam settings) for the fall.

4. Facilitate accessibility of teaching materials

As always, whether a course is taught in person or remotely, course materials should be accessible to all students. New materials developed for online courses should be designed to be accessible to individuals with vision and hearing disabilities (i.e., text readable by screen readers, audio transcription and video captioning, alternative text to describe images and graphics, descriptive hyperlinks). This will enable
Student and Disability Services to assist with accommodation of other individual disabilities upon request as has been the norm with in-person teaching. Individual faculty members and their departments have primary responsibility for ensuring that their courses meet the baseline accessibility standards. To support this effort, Cornell has acquired university-wide licenses to additional tools that will assist in this effort. The table below lists these tools:

<table>
<thead>
<tr>
<th>Name</th>
<th>Purpose</th>
<th>Comment</th>
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<tbody>
<tr>
<td>Ally</td>
<td>Automatically provides students with accessible versions of many course materials, indicates the degree of accessibility of course materials, and instructs on how to generate alternative accessible formats</td>
<td>Integrated into Canvas</td>
</tr>
<tr>
<td>Equidox</td>
<td>Semi-automated PDF remediation software solution that converts inaccessible PDF documents</td>
<td></td>
</tr>
<tr>
<td>Ava</td>
<td>Zoom captioning (live)</td>
<td>Better quality for technical content</td>
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The Center for Teaching Innovation and CIT provides both consultation services and training to use specific tools to facilitate accessibility in an online learning environment. A team of CTI and CIT staff are training a number of staff volunteers drawn from all colleges, to support faculty use of the new tools.

Additionally, the library can be a valuable resource to faculty in their quest to identify teaching materials that are already fully accessible and, in many cases, the judicious choice of such materials greatly alleviates accessibility issues. Ways to contact and work with the library will be clearly identified.

**Recommendation:** In addition to the ongoing efforts, we recommend that departments identify and train additional staff members to support fall instructors. Publicize the emerging training resources and websites:

- [CTI Workshops & Resources](URL and training resources and workshops under development now)
- [CIT Workshops & Classes](#)

5. **Hardware/access/technology help for instructors and students**

**Wifi coverage for student on campus:** If students are on campus and participate in classes remotely, high speed internet access from dorm rooms and dining halls will be essential. CIT staff are in the process of investigating weak wifi coverage spots (by looking at data from wifi access maps and by visiting spaces) and will prepare proposals for how to address them.

**Home office technology needs:** We know from the Spring 2020 remote teaching experience that home office technology is critical to successful teaching and learning. In all Fall 2020 scenarios, instructors (faculty and students) may have to teach from home, and learners may be off campus. For example, access to stable internet and adequate hardware was one of the top concerns for graduate and professional students, as revealed in a recent survey. Financial issues and delays in supply chains have to be addressed as best we can.
Recommendations:

- Facilitate ways for instructors (including TAs) to retrieve equipment to teach from home if necessary. We note that plans and oversight for access to buildings and offices are being developed in the C-ROR committee.
- Address computing needs in financial aid packages (including need for data plans or wifi hotspots)
- Increase the Access Fund for undergraduate, graduate and professional students
- Investigate and facilitate remote access to software such as Adobe Suite (see section 6 for more detail on software needs for remote work)
- Accelerate central procurement of additional laptops, tablets, mobile hotspots, tablets with styluses etc. that can be given out as part of the lending library. This has to be done as soon as possible, to allow for delays in the supply chain. Also identify ways for departments to surface technology needs, including for graduate students, and join larger central procurement efforts.

Classroom technology: During the Spring 2020, many of the issues with respect to classroom technology did not rise to the level of a concern as faculty were forced to teach from their homes during the full NY Pause. As we begin the return to campus and with expectation that classrooms will be either in use (hybrid) or available (even for fully online), classroom facilities to enable a minimal acceptable level of lecture recording will become critical. Adoption of high-performance lecture capture (or distance learning) technologies is likely to be prohibitively expensive, but smaller scale technical enhancements would be appropriate:

- Remote RF/Bluetooth label microphones for audio capture that would integrate with classroom computers for faculty computers with Zoom
- High resolution and quality “web-cams” with Zoom capability for lecture capture; some minimal funds for students to actively follow classroom discussion may also be appropriate

Mini-recording studios: In a fully online teaching modality, as well as for development of asynchronous content in any of the hybrid modalities, substantial quality enhancements in recorded materials would be possible with dedicated facilities for lecture capture and presentation. There exist already a limited number of high-quality recording studios both on campus and at the eCornell facilities on South Hill. In addition, CTI has a small self-recording studio for faculty (see CTI link). However, these studios are probably insufficient to address the potential need. A number of similar, smaller moderate quality, but still well-equipped recording studios distributed among the colleges could efficiently facilitate the development of online instructional materials. It is also likely that these needs would persist and be useful beyond the Covid-19 crisis. These studios would require only minimal space (<100 ft² offices) with, for example:

- Anechoic wall hanging (reduced background noise)
- High quality microphones, both stand mounted and lapel/ear
- Multiple high-quality cameras and lighting
- Blue/green screens (virtual backgrounds), limited backdrops
- Multiple monitor configuration with document capture (paper) and dedicated pen input devices (Wacom type).
- Wall mounted large display (consumer grade 70” monitor) for “stand-up” lectures with high-quality capture
• Options for use of an in-room computer configured for multiple capture modes (Panopto, other) or connection of faculty computers to a USB-3 or similar docking station
• Training and support for the equipment and use

These hubs could be based on existing studios with a well-defined investment limit (target less than 5K/studio. In addition, readily available hardware (COTS) as a secondary preference for rapid deployment of additional rooms if warranted by demand should also be made available.

**Recommendation:** Encourage colleges to stand up a number of smaller, but still well-equipped and moderate quality, recording studios. Assemble a list of specific technical requirements and possibly coordinate a purchase order.

### 6. Adoption of new tools and specialized software needs

Across the colleges, a number of new software services emerged as essential to support certain teaching activities. Others are being added in consultation with faculty who have identified teaching needs.

Apps on Demand (AWS AppStream) makes suites of software applications that used to be available in physical computer labs accessible to students on their desktops, directly through a Canvas integration. The service has only been available and piloted very recently and became extremely important during the unexpected remote teaching situation. Apps on Demand became a critical vehicle for many instructors to deliver content remotely. In the spring, a small group of pilot classes (for example in Engineering, Architecture, Finance) went forward, with departments bearing the cost of software licensing. Cornell has now made it possible for all instructors to use the service in the fall semester. Departments would continue to arrange for the software application licenses. We have seen an accelerated adoption by instructors and students due to the emergency and will continue to see it used.

A second example is classroom polling. Both Poll Everywhere and iClicker Reef for online instruction were free. Faculty reported good success using the services and continued use of polling should be considered for the fall semester. In general, faculty point out that a university-wide solution for polling, and central support for polling software should be explored.

A third example is Gradescope, a software designed to streamline grading of assignments. Gradescope can make grading more efficient and equitable and facilitates grading among TAs and instructors who may be in different locations. Made available to Cornell this spring, many Cornell instructors adopted Gradescope when they moved to remote teaching.

Hypothes.is is a social annotation software that allows students to share notes and commentary, and engage in discussion with instructors and other students, inside course readings. It integrates with Canvas and is available to instructors as part of a free pilot this fall.

Feedback Fruits is a peer review software that helps faculty manage students engaging in peer review of course assignments. It is integrated with Canvas and is available to instructors as part of a free pilot this fall.

Additional available learning technologies can be found on the CTI [website](#).

Several departments have submitted additional statements of need for specialized software. For example, music and performance instruction depends on near-zero-latency communication, and high-
quality audio. It is exceptionally challenging for remote instruction to accurately simulate the process of making music in person. The department of music has explored technology options that would improve the speed and quality of transmitting audio for both online instruction and virtual performance. Several new tools are being explored for fall instruction.

7. Summary and outlook:

Over the past 3 months, university infrastructure, training, and support rose to the unprecedented challenge of supporting an emergency seismic shift from traditional in-person instruction to a purely online format. CIT worked to ensure access and security of technological platforms. CTI worked around the clock to support faculty in shifting the format and structure of their courses. Faculty gathered (virtually) to share ideas, tools, and techniques for innovative coursework and pedagogical design, as well as for supporting students during this difficult public health crisis. Although not perfectly seamless, the success was greater than possibly could have been anticipated and is a credit to the students, faculty, and staff who worked hard to make the most out of an extremely difficult situation.

Moving into the fall, this dedication and hard work will be crucial to our successful adaptation to the new model of instruction that is chosen. Although this adaptation is an enormous amount of work for all involved – students, faculty, and staff – and is taking place against the backdrop of one of the most difficult times in many of our lives, it also represents an unprecedented opportunity. Never before has the university community collectively spent so much effort and attention at one time innovating and sharing ideas about enhancing teaching and education. We are also seeing accelerated adoption of innovative tools and exploration of new ways of teaching. This is bound to have a profound impact.

Some examples of innovative teaching experiences, new ideas, experimentation with novel educational technology, and substantive engagement around teaching and learning in the remote teaching world were described in the following Cornell Chronicle articles:

https://news.cornell.edu/stories/2020/05/bending-create-homemade-musical-instruments
https://news.cornell.edu/stories/2020/04/lab-instructors-adapt-remote-teaching
https://news.cornell.edu/stories/2020/05/students-faculty-make-art-time-coronavirus
https://news.cornell.edu/stories/2020/05/six-stories-six-weeks-virtual-learning