A Pandemic HyFlex Story at Central Michigan University

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It was the spring of 2020, and there was so much uncertainty in the world. The COVID-19 pandemic brought a new set of struggles to an institution already facing challenges (Son et al., 2020). Even before the pandemic, budget challenges severely impacted Central Michigan University (CMU) due to the tremendous reduction of state appropriations and the decline in enrollment. Like many in higher education, the demographic shifts of the country left universities like CMU in a position where they were competing for every student. With the rising costs of tuition, declining state funding, and increased competition for research grants, universities were finding it harder to maintain their financial stability. In addition, the COVID-19 pandemic brought its own set of financial challenges, including decreased enrollment (accompanied by decreased tuition revenue) and increased costs for technology and safety measures (Krishnamurthy, 2020). Therefore, finding a balance between cost-cutting and maintaining academic quality remains a delicate challenge for higher education institutions even to this day.

The pandemic has many stories of suffering, but it also created a situation that forced the world to innovate and adapt. One of the few positive aspects of the pandemic that should be recognized relates to our ability to change and be resilient. This story is about how CMU implemented HyFlex to be resilient during the pandemic (Andera, 2022). It was amazing to see how fast things changed at CMU. Higher Education is known for its slow pace of change, but the pandemic forced higher education to change at a speed that was unique and accelerated. Decision-making was streamlined, and leaders made decisions with limited information since we were working in uncharted territory and with extreme urgency.

Faculty who had never taught in online formats were immediately thrust into new learning modalities (The Chronicle of Higher Education, 2020). Entire courses were reworked in a matter of days to accommodate the shift in course formats. A very close peer working with faculty on these adaptations liked to say "we are making a number of years' worth of progress and changes in a matter of weeks". In the spring 2020 semester, students went on spring break but were asked to return to online courses ONLY to complete that spring semester. In Michigan, the Governor had issued a stay-at-home order. A worldwide pandemic had shut down the world.

Spring 2020 was a challenging semester for everyone. One of the silver linings at CMU was the way academic support units responded to the challenge. The Office of Information Technology (OIT) was accustomed to developing tabletop exercises to deal with various threats. Handling a pandemic was never one of those exercises. Nevertheless, the OIT team responded extremely well with the little knowledge that we had during the beginning of the pandemic. I have joked often saying "Leaders should have bought the OIT members of the team Superman caps with a flying C (CMU's logo) on them since they were flying around saving the day". At the end of the spring 2020 semester, the Academic Senate of CMU acknowledged the herculean efforts of the Office of Information Technology by passing a resolution to commend us.

Figure 1. Resolution to Commend OIT

The Beginning of HyFlex at CMU

Every institution's story about how HyFlex started at their institution is unique. Many times, it is driven by faculty who are looking to expand educational pathways for students (Beatty, 2019). For CMU, it was driven by the desire to stay relevant and operational. Leaders across CMU and the nation were grappling with ways to keep students learning in a safe environment during the pandemic (Educause, 2020; Educause, 2021; Iglesias-Pradas et al., 2021). The HyFlex proposal started from the Academic and Research Computing team that supports five of the seven colleges. At that time, the IT professionals discussed how they could help the university be resilient and survive the pandemic. This team of IT professionals always supported the classrooms. They also understood, as IT professionals, the need to be adaptable and to plan for many different scenarios. One of the buildings on campus had purchased webcams for all their podium classroom setups. They primarily did this to invite special guests into the classroom and to have the class join other classes across the world in a virtual field trip scenario. The proposal to equip all podiums across campus with a "webcam-on-a-stick" was quickly developed from this model. The proposal was sent to leadership on a Thursday.

The initial presentation to leadership went well, but there was an understanding that many of the curriculum and instructional best practices would be required to make this idea successful. Leadership asked the project team to expand their thinking and return with a more robust campus-wide proposal. The Registrar and Curriculum and Instructional Support team joined the project, which took the technical proposal to a more robust level. In their research, the project team identified that their implementation was a teaching modality Dr. Brian Beatty termed HyFlex, which is an amalgamation of "Hybrid and Flexible" (Beatty, 2019).

A revised campus-wide proposal was approved four business days after the expanded team helped flesh out the ideas. The speed of decision-making was essential to the project's success since the world had supply chain issues and everyone needed similar equipment. The HyFlex proposal called for technology to be installed in the classrooms which

best enabled multiple students (or instructors) to join the physical spaces from remote locations. The proposal was built with the following underlying principles:

- HyFlex defined: In a HyFlex course, courses are delivered both in person and online at the same time by the same faculty member. Students can then choose for each class meeting whether to attend class in person or to join it online. The underlying design ethos behind the HyFlex Model is flexibility and student choice (Maloney & Kim, 2020).
- While every attempt will be made to leave technical options flexible, the installed technology, configuration, and communication will presume that WebEx will be the online system used for instructional delivery.
- Provide, at a minimum, basic functionality to every on-campus classroom, except for special-purpose labs that are used in a manner whose existing use cases would make virtual attendance either unconducive or require a much more complex approach to virtualization to be viable.
- Recognition of current market solutions available in quantity given large spread competition across all sectors for similar technologies.
- Deliver minimum viable solutions capable of installation prior to day one of Fall 2020 instruction.
- Priority has been given to technology that provides the best value/impact per dollar, not the least or highest quality solution.
- Priority has been given to enhanced audio quality over video quality.
- Specific room recommendations have been made using only objective and measurable criteria.

The Implementation

The timeline for implementation was extremely aggressive. As Figure 2 highlights, the time for procuring the needed hardware, implementing the changes in over 300 classrooms, and roll out training and support for HyFlex was fast.

Figure 2. Project Timeline
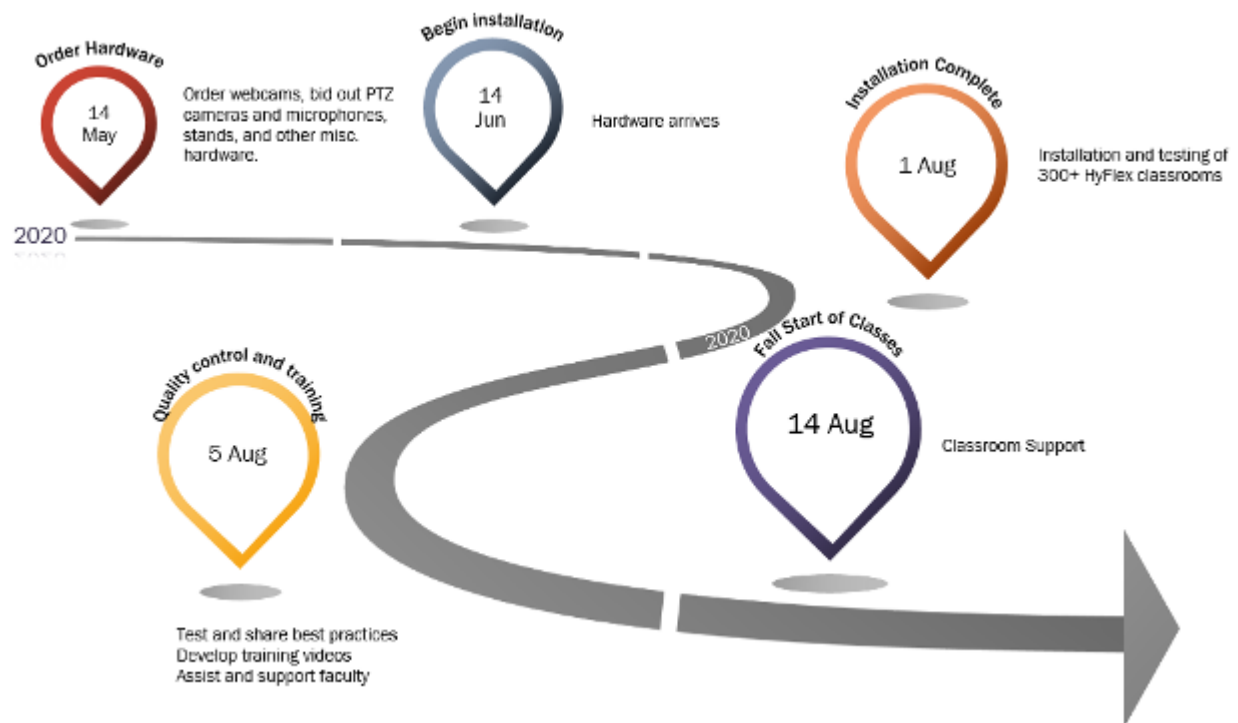
All existing classrooms were broken up into TYPES, with each progressive TYPE potentially providing a more extensive virtual experience.

Type 1 (See Appendix A): Labeled "Webcam-on-a-stick", provided a cost-sensitive option that is quick to install, a foundational option in classrooms for recording lectures and/or broadcasting to students attending remotely. A podium-mounted USB Webcam was installed in these classrooms, which could manually "swivel" between an instructor or student view. For Type 1 rooms, the USB Webcam acted as both the video and audio device. A total of **181** classrooms were set up as type 1, allowing them to be HyFlex capable.

Type 2 (See Appendix B): This type adds enhanced audio capabilities to the Type 1 deployment through two ceiling-mounted microphones. A podium-mounted USB Webcam was still installed and needed to be manually adjusted between the instructor and student view. Additional audio was received by microphones mounted in the ceiling. A total of **93** rooms were equipped as Type 2 classrooms with seating capacity between 60 and 87.

Type 3 (See Appendix C): Type 3 builds upon previous types by adding a PTZ (pan-tilt-zoom) professional camera installed in the room to capture video of the instructor, as well as a wireless microphone system to capture audio from the instructor. One additional boundary microphone was installed on the podium facing the students. A podium-mounted USB Webcam was still installed to provide a student view. A total of 26 classrooms with a seating capacity greater than **87** were upgraded to Type 3.

Technology Support

Amidst the chaos of the pandemic, a dedicated technology organization emerged as true superheroes, joining forces with the university to provide crucial support and facilitate the transition to remote learning. Displaying exceptional agility, expertise, and commitment, the IT team successfully implemented the HyFlex model in over 300 classrooms in an astonishingly short period of time. This herculean effort allowed students to choose between attending in-person, online, or through a blend of both, providing them with the flexibility and accessibility they desperately needed during those uncertain times. By leveraging its technological prowess, CMU not only ensured the continuity of education for countless students but also played a pivotal role in fostering resilience within the institution. The IT Team's tireless work served as a shining example of the power of collaboration, innovation, and adaptability, and their impact will be remembered as a testament to the unwavering spirit of educators and technologists coming together to overcome adversity and safeguard the future of the institution.

The HyFlex project brought out some of the best qualities of the IT professionals at CMU. There were a lot of unknowns as the project got approved, but the team was energetic to make a difference and support the needs of the institution. The rapid approval and support by top CMU leadership, including President Dr. Robert Davies, allowed the technology implementation team to get moving quickly. Equipment was purchased right away, and during the pandemic, this speed in decision-making was essential.

A small team developed a plan for implementation. This team focused on making the technology as easy as possible. Faculty had transitioned in the spring of 2020 from face-to-face courses to online. The implementation team wanted to leverage the knowledge gained from that emergency teaching into this new modality. Classrooms were equipped with webcams on a pivoting stand on every podium. This allowed faculty to leverage the tools they were familiar with to teach online courses in the simplest fashion. It was essentially why the first proposal was proposed as "webcam-on-a-stick" to not scare any faculty and keep terms simple. There was a lot of knowledge gained from a pedagogical standpoint from the HyFlex book (Beatty, 2019) though, that was incorporated into training material.

Figure 3. Training Video providing 6 Tips for HyFlex

[videos available at https://www.cmich.edu/offices-departments/curriculum-instructional-support/access-course-delivery-services/hybrid-flexible-(hyflex)-instruction]

Document cameras were part of the previous mediation and each of these was attached to the computer so that they could be leveraged for sharing physical items with remote users. For classes that used the whiteboard/blackboard heavily, this allowed faculty to write on a piece of paper and share that with the face-to-face students on the projector, while the remote students could also view it by seeing the camera app.

The project team decided to use a tool called Microsoft Team to be used as a dispatch and communication tool. A new team was developed with various tags for each of the buildings. Training material and frequently asked questions were developed and provided as part of that team. Training was developed for troubleshooting steps. Data analysis was provided on the classroom usage to each of the support teams. There was a lot of preparation without an understanding if any of it would work.

Figure 4. Training Video providing 6 Steps for Setting up for a HyFlex classroom

[videos available at https://www.cmich.edu/offices-departments/curriculum-instructional-support/access-course-delivery-services/hybrid-flexible-(hyflex)-instruction]

There was a strong need to change how classroom support worked and to expand the support footprint across campus. Toward the end of summer, the IT leadership team reached out to anyone with technical knowledge and asked for help. Over 100 staff and IT student employees answered the call and showed up for classroom dispatch training. It was a special time for people to come together and provide their expertise no matter what area they worked in. There were IT professionals from just about every team represented. Team members who normally just focus on project management, programming, server support, and many other various technology disciplines volunteered to assist in classroom support for the first few weeks of the semester. There was a belief that if we were able to overcome the first few weeks of the semester, the faculty and students would be able to adapt and grow comfortable with this new modality. The Office of Information Technology positioned IT professionals in buildings across the university and canvased as many of the locations as possible. No one really knew if the plans would work.

As the fall 2020 semester started, the first classroom dispatches were posted. A faculty picked up a podium phone that calls the IT helpdesk directly. The IT student at the helpdesk would post to the Microsoft team with the tag of the building and room number. The closest IT professional would respond with "I got it" and their current location. This current location could allow the nearest IT professional to try to respond and call others off. This process worked extremely well during the beginning of the semester rush.

To make the HyFlex model work, it was imperative that IT had a presence and that the faculty felt supported. The overwhelming support that the IT professionals had to respond to classroom issues quickly was a difference maker in the adoption and overall success of the fall 2020 semester.

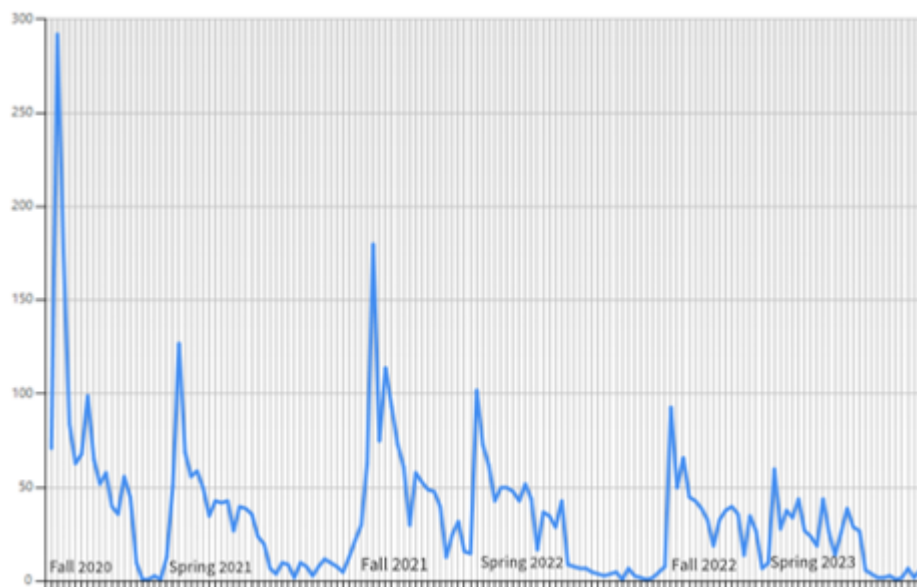Figure 5. Number of HyFlex Support Calls

Figure 5 represents the IT tickets that correspond to classroom response and the new HyFlex support model that was implemented during the pandemic. It is interesting to note that the peaks all correspond to the start of a semester. The largest peak was in the fall 2020 semester when HyFlex was first introduced in mass. Once the team was able to train users and get faculty comfortable with this teaching modality, the number of tickets dropped substantially during each semester. There was a peak in support at the start of the semester but as faculty got comfortable with the technology, the support work declined. Fall semesters had more support issues compared to the spring semester over the three academic years. This could be explained by the number of technical changes that happened over the summer, and many new faculty started teaching in new locations or new course formats in the fall. In total, there are over 5,000 support tickets represented in the three years of data regarding HyFlex support over the three academic years.

Stakeholder Perspectives: Faculty, Students, Administration and President, and Implementation Project Lead

Faculty Perspective

As a project leader who implemented HyFlex across campus, I had the opportunity to interact with a plethora of faculty as they made a transition to HyFlex. Faculty shared their personal experiences with me directly. The CMU faculty union administered an open-ended survey for all faculty during the fall 2020 semester that was anonymous and was later shared with me to better support these faculty and improve CMU's HyFlex model. The following data comes from that survey.

Teaching both in-class students and online students simultaneously was a challenge. Many of the faculty did understand the unique circumstances of the pandemic, making HyFlex an ideal course format to help students during this unprecedented time. Faculty did share their fears of teaching with all this new technology. Many faculty struggled with the flexibility of HyFlex courses which, over time, had students choosing the online option. This left faculty in many courses teaching in mostly empty classrooms while most students decided to join online.

One faculty expressed their challenge in the HyFlex format in the following way. "I also experienced a lot of technical issues, partly due to my inexperience with Webex and with multitasking: During class time, I must oversee several things at the same time: multi-modal instruction, providing feedback, keeping engagement, keeping track of attendance and participation, be aware of the camera, sound, be able to seamless switch from PowerPoint to camera, and the chat room: there are no words to describe the level of stress this creates every day and eight times a week."

One faculty explained the challenge as "HyFlex has made it far easier for students to simply not come to class meetings, or to sign in but then never participate. That of course seriously undermines their learning and is devasting to

the grades of some. The near refusal of most students to turn on their video (or even respond via audio) makes me feel (at times) like I might as well be teaching via radio (or even telegraph)." Another faculty wrote "In three of the classes a TA who helps with some of these aspects and in one of the classes there is no TA, I ask sometimes students to help but I realize it is not their job, they should be engaged in class content not on the quality of the sound or the chat box."

While we did receive a lot of pushback from faculty on the challenges that teaching in the HyFlex model, many faculty also acknowledged positive changes. One faculty stated, "This has posed some serious challenges that have stretched me to learn and to adapt and, in some meaningful ways (perhaps) to become a better teacher (and I certainly have made many important improvements since teaching online last spring)."

Another faculty wrote "Students get more flexibility" while another wrote "Students and faculty have less of a chance to get COVID". There were multiple comments about the new ability for faculty to record their lecture and make them available to students outside of class. "It is very nice to be able to record my instruction and then have the video (and transcripts!) available soon thereafter. I do not do this with every class, but when I want to do so, it has been very easy." One faculty stated, "HyFlex is working well for the classes I am teaching. I feel confident using the system. And, very grateful there are expert technicians around that can help."

The adoption of new course modalities, including the HyFlex model, and the integration of advanced technologies in the classroom have led to a myriad of changes for faculty members. Embracing innovative approaches such as blended learning, flipped classrooms, online instruction, and the HyFlex model - which allows students to choose between attending in-person, online, or through a combination of both - has enabled educators to create more dynamic, interactive, and personalized learning experiences for their students. Furthermore, these advancements have fostered an environment that encourages collaboration, critical thinking, and problem-solving skills, while also promoting a more inclusive and accessible education for all students, regardless of their geographical location or personal circumstances. Overall, the integration of technology and innovative course modalities, such as the HyFlex model, in the classroom has enabled faculty to elevate the quality of education and better prepare students for success in the rapidly evolving, technology-driven world.

Student Perspective

In Spring 2021, the Multi-Institutional Study of Leadership (MSL) survey was conducted for all undergraduate students at CMU. The MSL examines the influences of higher education on college student leadership development and comprises over 400 variables. Due to the COVID-19 pandemic, additional questions regarding pandemic perceptions and experiences were added to the 2021 instrument. The MSL data was combined with institutional data and only students that took a HyFlex course were included in the resulting dataset. The following responses come from undergraduate students who responded to the MSL survey and had taken a HyFlex course at CMU.

While we understand the pandemic was an extremely difficult time for students in general, many found the changes brought on by CMU to be the right decision at the time, and these students demonstrated great adaptability and resiliency. As one student stated, "CMU has done everything in its power to ensure a safe environment for the students while transitioning back to mostly face-to-face learning. Faculty have been supportive and understanding, and most due dates for major assignments have been flexible and/or negotiable. Overall, they have done their best to keep our stress levels low, and our understanding of course material high." Another student writes, "First year at college but feel Central Michigan University adapted well educationally."

Many students shared their appreciation for the flexibility that HyFlex offered. As one student stated a positive aspect of how the pandemic impacted their educational experience by giving them the "ability to participate in classes in HyFlex format from my home as an older student with children that were impacted by school closures." Students, especially non-traditional students, were offered many courses in this new HyFlex modality that prior to the pandemic were only offered in a face-to-face format. The rapid change of the university to embrace HyFlex during the pandemic opened many more courses to these students. As one student stated, "CMU offers their classes in a HyFlex format, meaning that students have the choice between in-person and online. The freedom that this format allows is fantastic.

I've been able to go home and visit family and not worry about missing class. I also have been able to do online class when I'm sick which has been beyond helpful."

In the survey responses, the following themes emerged:

Flexibility and Convenience:

·   Online format allowed for flexibility in studying and attending classes from anywhere, including the comfort of home or while traveling.

·   The option to choose between online and in-person classes provided convenience and saved time on commuting.

·   Ability to work at my own pace and manage time effectively.

·   More personalized instruction and access to resources online.

·   Easier participation in classes, especially for older students or those with children impacted by school closures.

Improved Access and Accommodations:

·   Enhanced accessibility for people with disabilities, allowing them to attend classes more easily.

·   Availability of recorded lectures and multiple-day test windows allowed for better revision and study.

·   Greater access to online tools and platforms, leading to improved technology skills.

·   Improved communication with professors and classmates through video conferencing.

Positive Learning Environment:

·   Reduction in social anxiety and more comfort in attending class from home or personal spaces.

·   Enhanced focus and better grades in online learning environments.

·   Ability to manage chronic pain or injuries while still attending class.

·   Opportunities to learn new skills and adapt to virtual formats, which can be useful for future careers.

·   Opportunity to engage in virtual projects, meetings, and events.

Faculty Support and Adaptability:

·   Professors and academic advisors showed understanding, flexibility, and support to students during the transition to online learning.

·   Faculty members went the extra mile to ensure a safe and successful learning environment.

·   Increased communication and feedback from faculty and staff to address student needs.

·   Faculty members embraced technology and provided new opportunities for engagement and learning.

Resilience and Growth:

·   Development of self-regulated learning skills and self-motivation.

·   Improved time management and ability to adapt to changing circumstances.

·   Acquisition of new technological skills and proficiency.

·   Increased independence and self-reliance in learning and completing assignments.

- Recognition of personal growth and increased appreciation for educational opportunities.

During the pandemic, students impacted by HyFlex teaching shared their experiences and perspectives. One student mentioned the importance of having "small study groups and buildings open," while another appreciated "having a comfortable dorm experience." Students valued the opportunity to attend classes in person with safety measures, with one student stating, "I love being online, but there's nothing like the experience of being in a classroom." Another student appreciated the option to participate in classes from home, saying, "Being able to attend class from anywhere has been a great bonus."

The accessibility of classes was a significant benefit highlighted by students. One student mentioned, "Accessibility to the classes themselves has been greatly improved, making it easier for people with disabilities to attend class." Another student with children impacted by school closures shared, "Ability to participate in classes in HyFlex format from my home as an older student with children that were impacted by school closures." This flexibility also helped students with chronic pain, as one mentioned, "I can learn better in an online format when I'm experiencing chronic pain."

The transition to online classes was generally smooth, with a student mentioning, "A quick and smooth transition to online classes compared to my high school." Students also appreciated the recorded lectures, as one noted, "Professors posting online lectures allows me to rewatch them as many times as I'd like." Another student appreciated the flexibility of online exams, saying, "A multiple-day window to take a test in the online format helps me study until I feel ready."

The HyFlex format received positive feedback from students. One student expressed, "HyFlex is a good class format". Another student found it to be "very flexible." Some students preferred asynchronous classes, with one saying, "HyFlex is flexible, although I would prefer asynchronous classes." Students also recognized the value of online learning for their personal circumstances, as one mentioned, "Being able to do work from home is a great bonus, but only if you are able to effectively prioritize your time."

The campus community and faculty support were highly appreciated by students. One student commended their university, stating, "CMU has done everything in their power to ensure a safe environment for the students while transitioning back to mostly face-to-face learning." Another student mentioned, "My professors have shown a lot of compassion and understanding toward us in terms of assignment deadlines."

Students felt that the HyFlex format provided flexibility, improved accessibility, and enhanced their educational experiences. They valued the ability to attend classes from anywhere, the availability of resources online, and the support of their professors. While some students preferred in-person learning, others found online classes to be more suitable for their needs. The resilience, adaptability, and technological skills gained during this time were also seen as valuable outcomes.

Overall, the responses highlight the benefits of online and hybrid learning formats, including increased flexibility, accessibility, convenience, and supportive faculty. While some students expressed a preference for in-person learning, many found the online format to be effective and appreciated the opportunities it provided. The experiences during the pandemic have also contributed to personal growth, resilience, and the development of important skills for the future.

Administrator Perspective

Throughout this HyFlex project, I had the opportunity to work with leaders across the institution. This was certainly a campus-wide initiative that took commitment from everyone. In a recent interview with a Vice Provost, they discussed with me the magnitude and incredible change effort it took to make this project a success. "It was an extraordinary effort in extraordinary times…it's amazing the organization didn't come unglued." This Vice Provost has led many change efforts in higher education in his 30-year career. One of my favorite quotes from that interview was "We didn't have time to get in our own way". This statement was about the success of this HyFlex project and the amazing ability of the entire institution to push such large change so quickly. Normally institutions of Higher Education don't move so swiftly. They tend to do a tremendous amount of analysis and data gathering. They promote shared governance and make many decisions through a collaborative effort. During the pandemic, it was essential to make decisions with less

information and in a timelier fashion. Part of the success of this HyFlex implementation was the forced urgency that was placed on decision-makers. At the time of the implementation, there were worldwide supply chain issues and institutions around the world were fighting for various technologies to stay operational. In a matter of a few days, this University-wide project went from an idea to approval. The agile project framework served the institution well and showed that a campus community could change rapidly when needed.

The importance of proactive planning and building resiliency in the work of higher education administrators cannot be overstated, especially in today's unpredictable and rapidly changing world. Developing strategies to prepare for emergencies and unexpected events is crucial for ensuring the continuity of educational services and maintaining a high standard of learning for all students. Implementing flexible course modalities, such as the HyFlex model, plays a significant role in achieving this objective. By offering students the choice to attend in-person, online, or through a combination of both, HyFlex courses provide a versatile solution that allows institutions to adapt seamlessly to a variety of emergency circumstances, such as natural disasters, pandemics, or other unforeseen disruptions. This flexibility not only minimizes the potential impact of such events on the learning experience but also promotes a more inclusive and accessible education system. Ultimately, incorporating resilient strategies and adaptable course modalities like the HyFlex model is essential for higher education administrators to navigate potential challenges effectively, safeguard the well-being of their students and staff, and ensure the long-term success of their institutions.

FROM THE ACADEMIC VISIONING PROCESS – Provost "The pandemic forced CMU to be nimble, flexible, avoid bureaucratic decision-making processes, and embrace technology. The pivot to the HyFlex modality during the pandemic was exciting. It will never be a favorite modality for faculty, we'd all prefer face-to-face, but faculty/staff/students stepped up to the challenge."

Presidential Perspective on the Pandemic and HyFlex

On June 23, 2023, I had the opportunity to interview the President of CMU, Dr. Robert Davies. The following is a summary of the interview of the HyFlex project and the various decisions that were made to support students' learning during the past three years of the pandemic.

During the interview, President Davies was asked to reflect on the challenges and opportunities faced by their university over the past three years, particularly during the unprecedented times of the COVID-19 pandemic. The President acknowledged that decision-making in universities is often perceived as slow but emphasized that it is a thoughtful process that considers a wealth of data, information, and viewpoints. The constantly changing nature of the pandemic presented one of the biggest challenges, with data and information shifting on a weekly, daily, and even hourly basis. The President emphasized the need to adapt and make decisions promptly, sometimes relying on blind faith and being mindful of the risks involved.

Maintaining the operational structures of the university while prioritizing safety was a key focus for CMU's President. He highlighted the importance of keeping the university open and operational to support faculty, staff, and students in pursuing their academic goals. Despite the challenges, the president proudly stated that CMU was among the few in the state that never closed during the pandemic's early days. Even when faced with uncertain circumstances, the president stressed the need for thoughtful decision-making, being mindful of the risks involved, and maintaining an unwavering commitment to supporting the university community.

One decision that the president mentioned, which initially raised some eyebrows, proved to be one of the best choices made by the university. They revealed that CMU started school two weeks earlier than usual in the fall of 2020, allowing them to complete the academic term before Thanksgiving. This decision turned out to be crucial, as shortly after the holiday, the governor ordered the shutdown of every other university. By acting proactively, CMU managed to avoid closure, demonstrating its commitment to ensuring students could maintain their academic progress and supporting the faculty and staff. The president emphasized the importance of thinking outside the box and remaining focused on the university's goals amidst challenging circumstances.

The president highlighted the thoughtful decision-making process, driven by the consideration of various data and viewpoints. The ever-changing nature of the pandemic necessitated adaptability and prompt decision-making, even in the face of uncertainty. The university's commitment to maintaining operational structures while prioritizing safety, supporting faculty, staff, and students, and thinking creatively proved essential in successfully navigating the unprecedented times. The decision to start the academic term early proved to be a pivotal move, enabling the university to continue operating while others had to shut down. Overall, the president emphasized CMU's dedication to its mission and unwavering support for its community throughout these challenging times.

When President Davies first heard the governor's stay-at-home order, he found it interesting and reflected on the events leading up to that decision. The day before the order was issued, the president had gathered everyone together to discuss spring break and when they should consider telling students not to return. They had specific markers in mind for when such a decision would be appropriate. The following morning, the president received a phone call from the Commissioner of the Mid-American Athletic Conference, who urgently called for a meeting with the presidents regarding the continuation of the basketball championship game in Cleveland. The decision was prompted by a professional player from the Utah Jazz, who had recently played in the same arena and subsequently tested positive for COVID-19.

During the meeting, various presentations were made by the convention authority and other individuals, emphasizing the safety precautions in place. The president believed that the commissioner should be the one to make the final decision rather than the university presidents. They also expressed concerns about the rapidly changing circumstances and the need for flexibility. Despite their reservations, most of the presidents, with the exception of President Davies, voted to continue the tournament. However, within a short time frame of an hour and a half, the commissioner called for another meeting after 22 athletic conferences had already canceled their tournaments due to a basketball official showing symptoms.

Ultimately, the tournament was canceled. The governor's subsequent stay-at-home order made the decision obvious. The president highlighted the importance of flexibility during such uncertain times. They believed that their vote against continuing the tournament was based on the need for the commissioner to make the decision and a feeling that the right questions were not being asked. The president acknowledged that the order from the governor made it a straightforward choice to cancel the tournament, but they emphasized the significance of remaining adaptable and making prompt decisions.

President Davies also shared his leadership philosophy, which involved making decisions rather than abstaining, as he believed that not making a decision is, in itself, a decision and often the worst one. He stressed the importance of timing when making decisions, as making them too early without sufficient information can be detrimental. The president used the analogy of an airplane course correction, explaining that it is easier to correct a slight deviation in the beginning rather than allow it to compound over time. He mentioned that when he initially decided to switch to remote learning, it was for a two-week period. However, as the situation progressed, it became clear that the campus would need to remain closed, and he adopted a fully online approach. The conversation then turned to how this decision-making approach influenced the rapid implementation of HyFlex teaching methods, which involved presenting proposals and gaining approval within a short timeframe.

In my interview with the President, I asked about his thoughts on the implementation of the HyFlex teaching approach. The President explained that the decision to adopt HyFlex was driven by the recognition of an equity issue and the need to cater to the diverse range of students at the university. They acknowledged the challenges faced by students during the pandemic, including limited access to computers and reliable internet. HyFlex was seen as a solution to ensure all students could continue their academic journey with flexibility.

The President recognized the benefits of HyFlex, particularly its ability to accommodate individual student needs and decisions. They also acknowledged the initial difficulties faced by some faculty members in adapting to a teaching approach that required simultaneous engagement with both in-person and remote students. However, the President

expressed confidence in the continuous improvement of technology and the development of effective teaching techniques by faculty members who embrace HyFlex.

When discussing the positive aspects of HyFlex, the President emphasized the opportunities it provided, such as incorporating guest speakers and unique experiences into the learning process. They anticipated further growth and evolution of this approach, catering to different learning modalities and preferences. The President also emphasized the importance of fostering a sense of community, even in a blended or remote environment and finding ways to facilitate physical connections when necessary.

As the conversation progressed, the President talked about other opportunities and trends in education, such as the use of virtual reality. He mentioned examples from other institutions and expressed curiosity about how virtual reality could be integrated into our university's teaching practices. The President also highlighted the importance of community interaction and discussed the potential impact of remote work on social dynamics. He expressed interest in exploring innovative uses of technology and preparing for future developments, even though virtual reality implementation may still be a few years away.

We then discussed the significance of the HyFlex project and its impact on our university. I shared my pride in the academic Senate's decision to include HyFlex as part of the Curriculum Authority Document (CAD) at CMU and mentioned the importance of adaptability and flexibility in our approach to teaching and learning. However, I also expressed my struggle with the idea of something being set in stone, as I am accustomed to continuous improvement and modifying approaches over time.

The President acknowledged the concerns and highlighted the opportunities that HyFlex brings, including increased effectiveness in administration and the ability to engage alumni and community members through remote participation. He emphasized the growing comfort level with technology and the potential for leveraging it to enhance teaching and learning experiences. We concluded the conversation by discussing future possibilities and the importance of maintaining a forward-thinking mindset.

Overall, our conversation revolved around the implementation of HyFlex, lessons learned, future opportunities, and the significance of continuous improvement in our teaching and learning practices.

Implementation Project Lead's Perspective (the author)

Education has experienced significant shifts recently, with the emergence of the HyFlex teaching model. HyFlex, or Hybrid-Flexible teaching, allows students to participate in classes in-person, remotely, or asynchronously through recorded sessions. This model offers maximum flexibility, potentially increasing attendance and enrollment while providing diverse learning options. However, it also presents challenges, requiring more preparation from professors and proper technology investments to accommodate different participation modes. Despite these challenges, the HyFlex model represents an opportunity to reevaluate higher education and leverage technology to enhance learning experiences.

For CMU, it helped our university be resilient during the pandemic. I feel privileged to be part of the core project team that helped implement and support this new modality. I had the chance to work on a truly university-wide project that made an impact on students during a difficult time. This new course modality is now included in the Curriculum Authority Document (CAD) for our institution and may live on past me. I feel a deep appreciation for the team who stepped up during the pandemic and delivered amazing creativity and support.

I want to take a moment to express my heartfelt gratitude and appreciation for the incredible work of the CMU team. Throughout our journey together, the team consistently demonstrated exceptional skills and expertise. Their ability to tackle complex challenges head-on and find innovative solutions is truly remarkable. It is your collective effort as a team that made all the difference. The seamless coordination and collaboration that the team exhibited are a testament to their professionalism and commitment. There was a supportive and encouraging work environment,

fostering a sense of camaraderie that empowered each team member to excel. Thank you to everyone who played a role in this project, it was truly an honor to work alongside such an amazing team.

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        cid=wcontentgrid_hp_1b

Appendix A: Type 1 Classroom [181]

Teaching Background and Theory

In order to provide maximum flexibility for class configuration and social distancing, we recommend that ALL classrooms be equipped with a base level of equipment allowing for distance learning. "Type 1 classrooms" for the purposes of this project are the smaller and lower-usage-anticipated classrooms common on campus. These Type 1 rooms are recommended to receive a podium-mounted USB webcam.

There are a number of classrooms already equipped with this equipment, primarily in CLASS and CBA. Rooms that already contain this base level of equipment will not be modified.

System

In-room video will be captured by a high-definition USB webcam. This webcam will be podium mounted, atop a ~17" post that allows for manual aiming of the camera. In classrooms with podium positions that prevent this arrangement, alternate mounting methods will be considered.

Instructors will be able to share the podium PC via the web conferencing software. Advanced instructors will also be able to share the document camera by opening an application on the PC while the PC screen is shared. Laptop, VHS, DVD/Blu-ray, markerboard/chalkboard content will not be intelligible via the webcam due to the lack of an optical zoom. Further, compression and bandwidth conditions can further degrade the capture of markerboard/chalkboard—therefore markerboard/chalkboard use should be discontinued in remote learning situations.

The webcam will need to be manually aimed at the appropriate target for the type of session being initiated. With an in-room instructor, the webcam will point at the likely location of the instructor, and positioning may need to be adjusted if the instructor does not remain stationary. With a remote instructor, the camera should be adjusted to best capture the maximum number of students—not all students are likely to be captured due to the limited field of view offered by webcam technology.

Existing document cameras can potentially be utilized as part of a distance learning session. Given that this usage may prove more difficult for some instructors, this should be considered an advanced and potentially "unadvertised" feature. Document cameras in existing digital classrooms can provide video to the podium PC via USB. To share this video with web conferencing software, either the selected camera will need to be switched within the web conferencing software OR the document camera video will need to be opened in an app on the PC WHILE the PC desktop is being shared. The latter is recommended, as the instructor video would still be available.

In-room sounds, including the instructor and student voices, will be captured via the webcam's built-in microphone. The intelligibility of voices at range may not be adequate for remote participants. Instructors should be encouraged to repeat student questions prior to answering in situations where the instructor is presenting locally.   For instances with remote instructors, it is advised that an operator seated at the instructor station repeat in-room questions for the instructor and other remote participants.

Figures A1 - A5. Technology for Type 1 Classroom

Figure A1. Floor Plan

Projector, Existing

USB Web cam,
360 degrees of motion
Built-in microphone
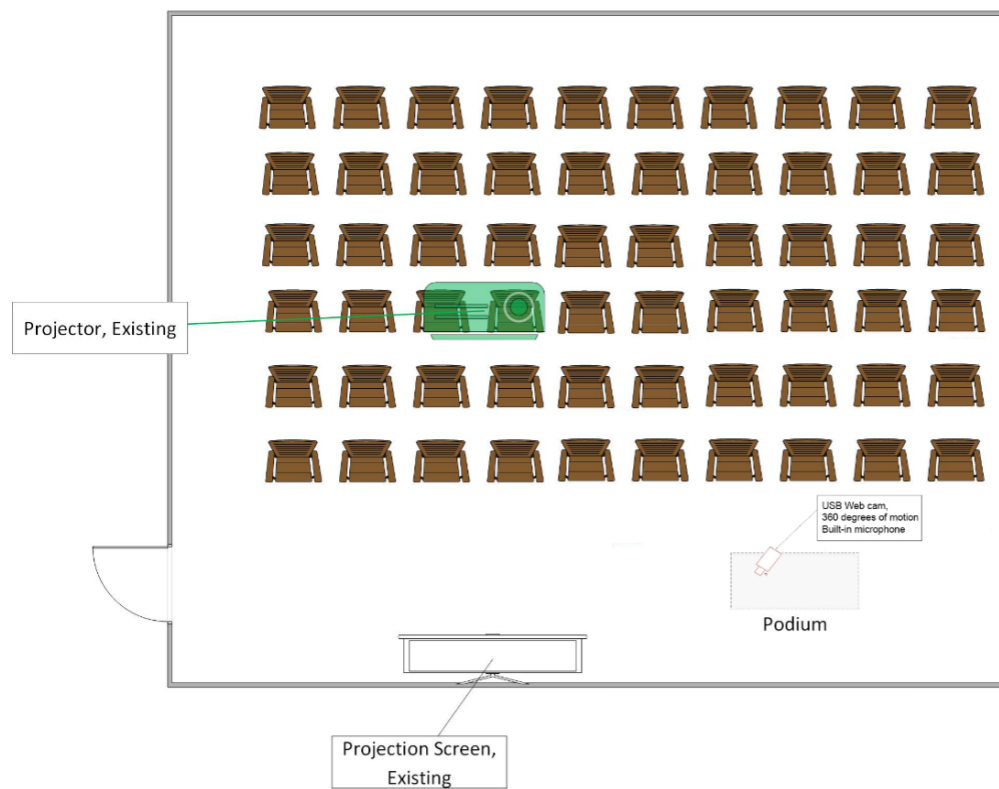
Podium

Projection Screen,
Existing

Figure A2. Webcam Mount (Post)

Figure A3. Webcam Note: Webcam post and webcam to be mounted on podium

Figure A4. Instructor view, PE 108

Figure A5. Student view, PE 108

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Appendix B: Type 2 Classroom [93]

Teaching Background and Theory

In weighing the best use of funds to provide the best experience to remote participants, we have deemed high-quality audio to be of higher value than high-quality video. Accordingly, we recommend the installation of a more advanced microphone system in rooms that are better suited for our anticipated constraints—namely large rooms as they provide more flexibility for holding classes with social distancing considerations. As a database of room square footage is not readily available to us, we'll base this on the pre-COVID19 "seating capacity" data that we currently have access to, assigning a Type 2 classification for rooms having between 60-87 seats, for a total of 33 rooms, and ordering hardware for an additional 60 rooms, with specific rooms to be determined by CIS as part of evaluation efforts for teaching modality.

Type 2 classrooms are also recommended to receive the same USB webcam as the Type 1 classrooms, mounted in the same configuration.

There are a number of classrooms that fall into this type that are already configured in either this manner or more advanced, particularly classrooms in the College of Health Professions and College of Medicine. Classrooms in this state will NOT be modified further, except in situations where a camera positioned to capture in-room students is not available.

System

In-room video will be captured by a high-definition USB webcam. This webcam will be podium mounted, atop a ~17" post that allows for manual aiming of the camera. In classrooms with podium positions that prevent this arrangement, alternate mounting methods will be considered.

Instructors will be able to share the podium PC via the web conferencing software. Advanced instructors will also be able to share the document camera by opening an application on the PC while the PC screen is shared. Laptop, VHS, DVD/Blu-ray, markerboard/chalkboard content will not be intelligible via the webcam due to the lack of an optical zoom. Further, compression and bandwidth conditions can further degrade the capture of markerboard/chalkboard—therefore markerboard/chalkboard use should be discontinued in remote learning situations.

The webcam will need to be manually aimed at the appropriate target for the type of session being initiated. With an in-room instructor, the webcam will point at the likely location of the instructor, and positioning may need to be adjusted if the instructor does not remain stationary. With a remote instructor, the camera should be adjusted to best capture the maximum number of students—not all students are likely to be captured due to the limited field of view offered by webcam technology.

Existing document cameras can potentially be utilized as part of a distance learning session. Given that this usage may prove more difficult for some instructors, this should be considered an advanced and potentially "unadvertised" feature. Document cameras in existing digital classrooms can provide video to the podium PC via USB. To share this video with web conferencing software, either the selected camera will need to be switched within the web conferencing software OR the document camera video will need to be opened in an app on the PC WHILE the PC desktop is being shared. The latter is recommended, as the instructor video would still be available.

In-room sounds, including the instructor and student voices, will be captured via 2 ceiling microphones. One microphone will be located near/above the instructor podium or teaching area, while the second will be positioned to best capture student questions. The mix of the audio captured by these 2 ceiling microphones will be provided to the PC via USB for use in web conferencing software.

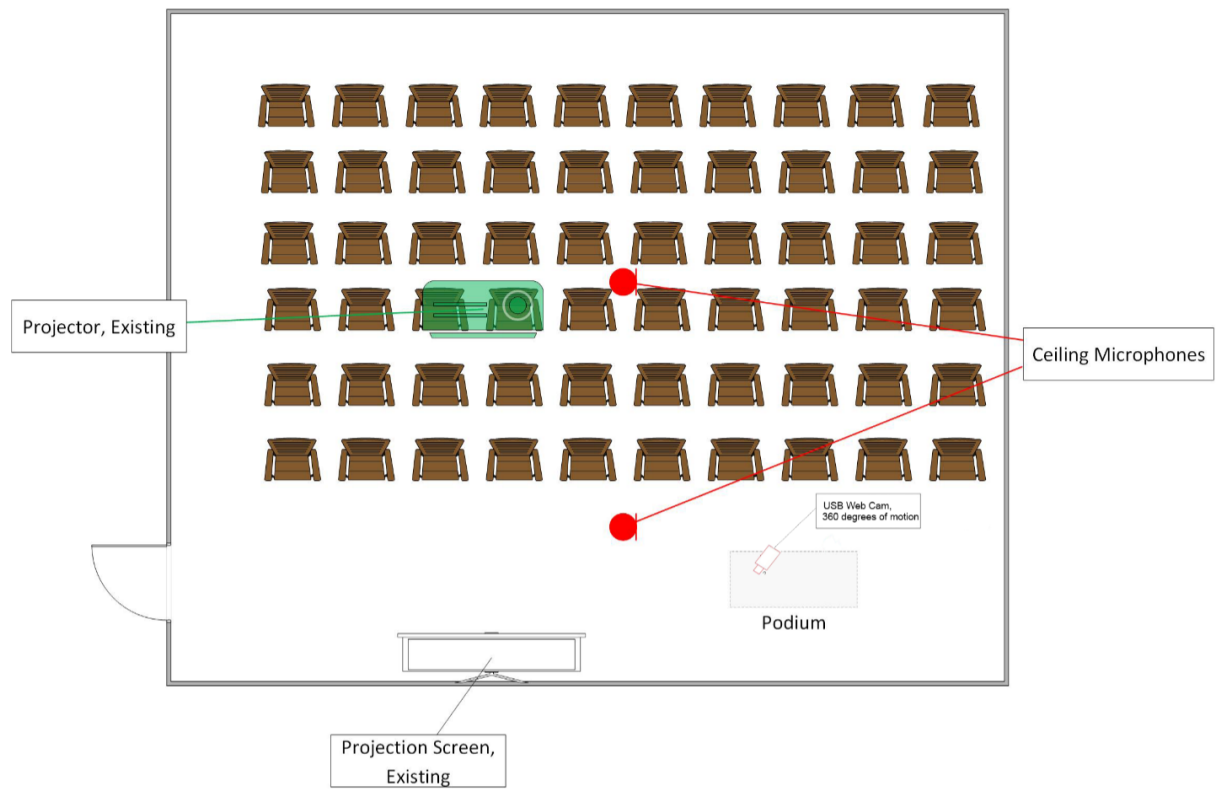## Figures B1 – B6. Technology for Type 2 Classroom

Figure B1. Floor Plan

Figure B2. Webcam Mount (Post)

Figure B3. Webcam

Figure B4. Ceiling Microphone

Figure B5. Instructor View, PE 108

Figure B6. Student View, PE 108

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Appendix C: Type 3 - Large Venue Classroom [26]

Teaching Background and Theory

Large venue classrooms are excellent candidates for a higher level of camera and microphone systems due to the potential higher capacities while allowing for social distancing.

Many of the large venue classrooms on campus already have camera and microphone systems that can be utilized for distance/remote learning via web conferencing applications. If the classroom has an existing high-definition instructor-facing PTZ camera and a wireless microphone connected [or connectable] to the in-room PC, the existing camera and microphone system was considered adequate and replacement was not recommended. Spaces in this category that do not have a camera/microphone system or currently have inadequate or derelict camera/microphone systems are recommended to receive new systems.

While there are several potential scenarios for instruction in these spaces, we can reduce these down to two modes: instructor teaching locally in-room and instructor teaching remotely to students in-room. To keep costs low while still providing a good quality experience to students, it is assumed that the video of the instructor must be high-quality, while the video of students provided to a remote instructor can be of lesser quality.

Instructors can share the podium PC via the web conferencing software. Advanced instructors will also be able to share the document camera by opening an application on the PC while the PC screen is shared. Laptop, VHS, and DVD/Blu-ray, markerboard/chalkboard content may be capturable via the instructor camera, visual intelligibility will vary

greatly with compression and bandwidth conditions and therefore markerboard/chalkboard use should be discontinued in remote learning situations.

System

Video of the instructor will be captured via a high-definition pan-tilt-zoom camera mounted in the room. The camera will be installed at a location that provides good-quality video of the instructor and minimizes installation time. This camera will provide its video feed to the podium computer via USB, and the camera can be controlled via the classroom touch panel.

Video of the students will be captured via a high-definition quality USB webcam, mounted on the podium via a post mount. The camera can be manually re-aimed by hand. No zoom is available, and the field of view may not pick up all students.

The proper camera must be selected when the web conferencing software is launched. If the previous classroom use was with a local instructor and is about to be used with a remote instructor, the selected camera must be modified.

The instructor's voice will be captured via a wireless Lavalier microphone and bodypack transmitter. A boundary microphone installed at the podium will capture student and other in-room sounds, including the instructor [and acts as a lower-quality backup to the instructor's wireless microphone]. A mix of these microphones will be provided to the PC via USB.

Existing document cameras can be utilized as part of a distance learning session. Given that this usage may prove more difficult for some instructors, this should be considered an advanced and potentially "unadvertised" feature. Document cameras in existing digital classrooms provide video to the podium PC via USB. To share this video with web conferencing software, either the selected camera will need to be switched within the web conferencing software OR the document camera video will need to be opened in an app on the PC WHILE the PC desktop is being shared. The latter is recommended, as the instructor video would still be available.

Figures C1 - C7. Technology for Type 3 Large Venue Classrooms

Figure C1. Camera Mount (Post)

Figure C2. Webcam

Figure C3. Instructor-facing camera

Figure C4. Instructor View, default view, HP 1020

Figure C5. Instructor View, wide view, HP 1020

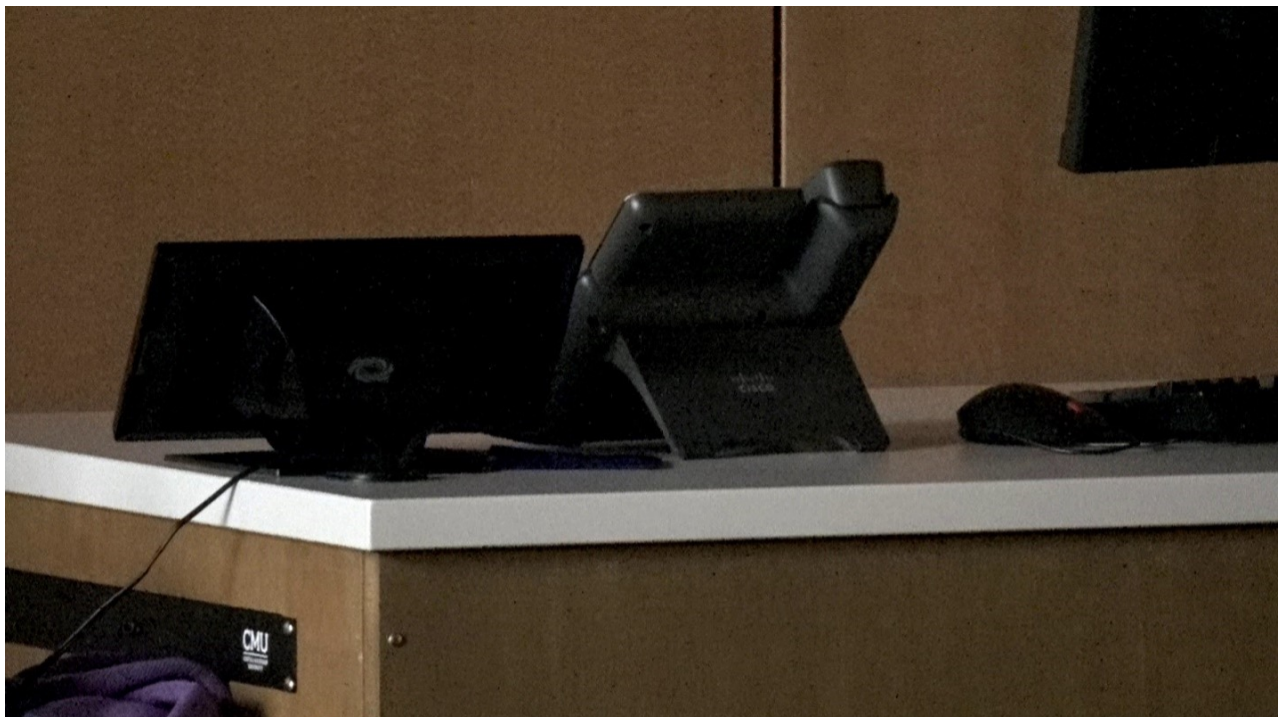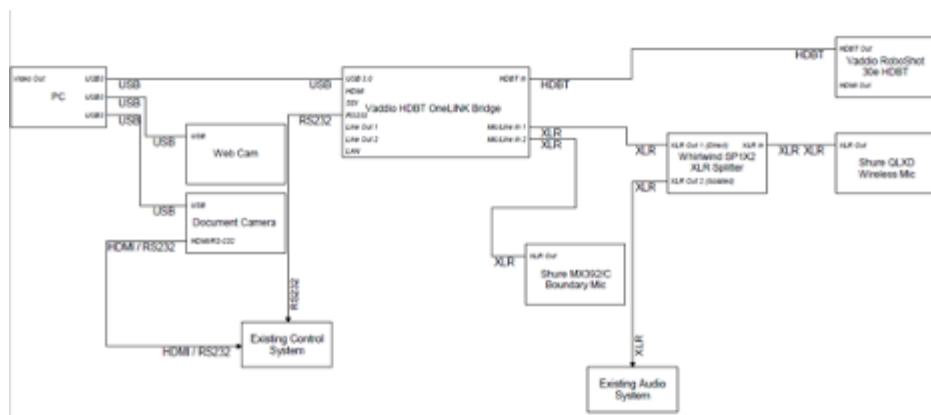Figure C6. Instructor View, maximum closeup, HP 1020

Figure C7. Student View, PE 127

Figure C8. System diagram, additional gear for large venue

Appendix D: Training video links

Figure 3: 6 Tips for Facilitating your HyFlex Classroom video can be found at:

https://chipcast.hosted.panopto.com/Panopto/Pages/Viewer.aspx?id=e5a41199-266f-49b3-9705-ac05012bc300

 6 Tips for FACILITATING your HyFlex Classroom (panopto.com)

Figure 4: 6 Steps for Setting up your HyFlex classroom video can be found at:

https://chipcast.hosted.panopto.com/Panopto/Pages/Viewer.aspx?id=634a03b1-ebfc-4e05-97a7-ac050104c061

6 Steps for SETTING UP your HyFlex Classroom (panopto.com)