Multi-Campus Courses Via video conference: An Assesment

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Abstract — In order to increase the level and continuity of research at the University of Puerto Rico at Mayagüez, a Memorandum of Understanding (MOU) has been developed and signed between this institution and two universities in the U.S. to establish a collaborative doctoral program. The students accepted in this program will obtain their PhD degrees from one of the U.S. universities, but will perform most of their research work at UPRM. As part of these Collaborative Programs and as part of the NSF Engineering Research center CASA, the students have the capability to take courses given by faculty in other campuses and attend research meetings via video conferencing. This effort has been possible thanks to the strong collaboration among professors from the four campuses involved in the Collaborative Adaptive Sensing of the Atmosphere Engineering Research Center (CASA). The CASA core partners are UPRM, CSU, OU and UMass. Two such courses took place in the Spring semester of 2005; these are "Polarimetric Doppler Weather Radar" by Dr. V. Bringi from CSU and "Hazardous Weather Detection" by Kelvin Droegemeier from OU. Another course in the fall of 2003 was also offered from OU to UPRM students by Dr. Yeary. Some of the challenges found during the development of these courses have been administrative, technical and of personnel.

Index Terms — *Collaborative PhD degree, Educational Model, Multi-campus course, underrepresented student*

One of the advantages in multidisciplinary centers is the ability to establish strong collaborations that can benefit all the parts. Once the center (in this case CASA) is established specialized courses are developed and offered to partners. In CASA some of the multidisciplinary courses under development includes electrical engineering, atmospheric sciences, meteorologist, computer sciences and even social sciences majors.

At the moment of offering a distance course live there are several alternatives that can be considered such as Integrated Services Digital Network (ISDN), Satellite broadcast and Video conferencing

systems based on IP such as WebEx or Polycom. In our case we used Polycom which has several advantages; most campuses already have connection to an existing IP infrastructure and it is the most economical solution in many cases. The main disadvantage is bandwidth requirements which can cause resolution and multi-point connection problems.

During the last couple of years we have improved the quality of course offering through video conference with recommendations based on previous experiences. It is expected that this paper will provide the necessary tools for institutions that are planning to implement multi-campus courses.

One of the most difficult task at the very beginning is to establish an appropriate day and time of the week to offer the course. In our case, four different time zones had to be considered, Colorado (MDT), Oklahoma (CDT), Massachusetts (EDT), and Puerto Rico (UTC/GMT) are separated by one hour each respectively during the daylight saving time season, back in March, Puerto Rico does not have daylight saving time which presents an additional concern for live courses. During the Spring semester, spring breaks are usually scheduled at different weeks for the institutions which also disrupts the flow of the course. Weather can also be the cause of University closing as well as celebration of holidays at different states. It has been our experience that most of the problems above can be easily solved by ensuring that the host institution is always ready to tape the course. Even though, the other institutions can tape the course if they wish, is always wise to require the host institution to do the taping in case the internet connection fails at one or all of the campuses. We recommend to digitally video tape each of the lectures and stream them on the web.

Figure 1 Students taking Multi-campus course at UPRM.

There is also a legitimate concern at the time the students register the course. To simplify administrative issues, the four partners have agreed to let the students register at their institution under a "special topics" course. In this fashion, students from UPRM for example, will get credit for a course originated in Oklahoma (or any of the other institutions) only at UPRM. There is also the option for the UPRM student to pay tuition in Oklahoma if he or she desires the course to be accredited at OU and not at UPRM. The amount of students at each campus is usually limited to low numbers (below 10), the main reason for this is that the professor teaching the course at the origin institution usually has developed a very specialized course where only he/she is the expert, making difficult for proctors at other campuses to grade the course work. In this manner the homework and exams to grade to the professor is not excessive. In our case, the professors teaching the class received the homework and exams from students of all four campuses, and he/she is responsible for the grading. It is worth to mention that the professor provides this service to the distant institutions ad-honorem, i.e., they don't receive extra compensation for the number of students outside his/her campus, but only for the students taking the course at the local campus. At each campus a local faculty, also ad-honorem works as proctor for exams and collecting homework. If this proctor has background in the course area, he/she may help with the grading, although this is not recommended to keep uniformity in the grading. The homework was delivered via email, fax or mail, at different times according to the need. For a multi-campus course, the professor should have the option of requesting a TA funding (or 1/2 TA) through the centers budget to assist the professor with the additional work load from the multi-campus course.

The TA should know of his/her multi-campus responsibilities. Perhaps set-up a web page for the courses, where the TA can make announcements, post deadlines, and students can download homework. In our experience, we realized it's better to send any Power Point presentation ahead of time, usually uploading it to the course web page, so that the students are ready with the presentation on their laptops before the class starts and can focus on the lecture, not on trying to read blurry slides, slides hidden behind the professor.

Figure 2 Multi-campus course at UPRM via Polycom by Dr. K. Droegemeier from OU

An important task before the beginning of the semester is that all campuses should coordinate testing of the course delivery mechanism in advance. In our case we employed Polycom multi-mode system with connections through the internet, which made every transmission free, apart of the initial cost of the equipment. A 42 inches plasma display allows for better resolutions and, in special occasions, simultaneously viewing more than one campus. The professor also has to be aware and prepared for a video course, for example the movement of the professor teaching the class can affect the resolution of the equations he/she is writing on the board, to solve the problem the camera has to be focused on the board at all times. Also, if the professor is using slides, during his/her lectures it is important that the font size and color combinations are adequate for video transmission. Here are some recommendations from the studetns participating in these type of courses.

- Provide a TA with some knowledge on the field is needed at each campus, office hours for the video conference course. This is because of the difficulty for the professor teaching the course to answer complicated questions that need a drawing or many equations, by email. Another solution would be to have office hours by Polycom.
- The person teaching the course should write big on the board, so that the other side of the connection does not have to adjust the camera from time to time to be able to write what is on the board. This continuous movement of the camera makes the following and understanding way more difficult. The sequence of the class is lost trying to follow what is written on the board. Archiving the lectures on something like MANIC is a great idea.
- The camera should be directly in front and high about head level of the host. Having the camera at waist level and/or at an angle difficult the view of the board.
- The room used for hosting should have the proper illumination. Lights near the board or just intensive light in the room will reflect and making the visibility of the board difficult.
- The camera of the host should have the auto-focus off. If the auto-focus is ON every time the host mover the camera will focus on the movement causing a distortion in the rest of the image.

Other important comments to take into account in terms of preparation ahead of time are
- Have each remote site power up and be "on the air" 15 minutes prior to the start of each lecture...in order to troubleshoot problems
- Have all materials available on the web prior to the lecture so that students can print/review them in advance or follow along on their laptops, where the quality of the image is better than via Polycom

Figure 3 Multi-campus course UPRM via Polycom by Dr. V. Bringi from CSU

Overall the whole experience was a challenge at the begining, but turned out to be a win-win situation in which students are exposed to researchers from different universities. Additional tips about video conferencing are giving by Yvonne Marie Andres on her web site titled Elements of an Effective CU-SeeMe Video Conference.

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