

## AN ECONOMICAL APPROACH TO DEVELOPING AND DISTRIBUTING COURSE VIDEOS THROUGH THE INTERNET

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This project began as a virtually no-tech project. It wasn't even a project at all. The University of Louisiana at Monroe (ULM), as with most universities, has students that cannot pass their mathematics courses no matter how hard they try. The project began with one student, who after many attempts at our developmental math course, was determined to finally pass. It was agreed that she would be allowed to attend the same class at two different meeting times. When she considered the material to be extremely difficult, she would attend the class three separate times in one day. After she was exposed to the material two to three times as much as most students, she finally passed the course, because as she said, "It makes so much more sense the second time I hear it." The discussion soon led the mathematics department to consider the fact that some students just need to be exposed to some mathematics over and over again but could not sit through the class two or three times a day. We wondered if there was a way that technology could help these students, without costing them. PowerPoint presentations were tried but were found not to be useful to the students. Animation of some sort was needed. The students wanted to see the problem completely worked out along with an explanation. It was decided that the Internet would be used to access course specific videos that correlated directly with the class lectures and text. Students are allowed free access to these textbook specific videos, which can be viewed as many times as they need. Even more exciting is the fact that over 3000 students have been impacted by these videos. The project has now extended into other math courses, as well as enhancing our method of instruction for courses offered through distance learning.

The videos are narrated by a mathematics instructor who has chosen the problems to film based on what is presented in class and the most frequently asked questions in the classroom setting. The instructors decided to film the problems on a black chalkboard, with only the problem and the solution in the video. There are no distractions away from the lesson or problem being taught. The difference between this and a written explanation, which is commonly found on the Internet, is that the student not only sees the steps, but they are presented one step at a time, with the instructors voice explaining each and every aspect of what being done as it is being done. No more wondering, "How did they get that next line?" The instructor explains it, and the student watches it being done. And if they don't understand it the first time, the student can watch it over and over again. Once a video is taped, it is then converted from an .avi file to a .wmv file using Windows Movie Maker, which makes for a much smaller file size. The videos are then placed on the University's website for anyone to access. The cost of the total production is minimal (less than \$100 if an adequate computer is already on hand) with the biggest cost being the instructor's time (each video takes approximately 3 times its actual playing length to film, compress, and publish on the web).

Initially the videos were produced in an instructor's kitchen with an inexpensive web cam, a 400 Mhz computer with windows ME (which includes Windows Movie Maker) and a small white board. The quality was not up to Hollywood standards but no student has ever complained; they are just grateful that the videos are there. Besides, the price is right; it's free for any student to access. As popularity of the videos grew (and more were requested), a green and then black chalkboard was used because it was felt that the quality/reduction of glare over that of the white board was more appealing. It was during this change from the white board to the chalk board, that it was found that by reducing glare and the "brightness" of the background and that by importing the .avi video files into Windows Movie Maker and saving them as .wmv files, we could compress the videos from 1/10 (whiteboard videos) to as little as 1/30 (green or blackboard videos) of the original file size. Hence, the smaller videos were much easier to download. It is our belief that this compression rate is one reason that our project is so unique.

With overwhelming feedback from the students, the department head arranged for a production studio on campus where more faculty members could be involved in the process of video development. This "production studio" consisted of a 6' X 15' closet, and the same "technology" used in the kitchen videos. The only difference has been the need for lots of black felt. Why? We found that the compression rate was as little as 1/5 in the "cave," as we so fondly call it. After many painstaking hours of modifying the videotaping environment, we discovered that the lighting source, in the small confined space, was reflecting off the back wall, onto the board. Hence, much more "white" in the videos, and much less compression. Our solution was to drape inexpensive black felt (less glare and mess than trying to paint) on the walls. It worked and the compression rate greatly improved.

The videos have become so popular that students with low-speed Internet access have created the demand for a CD library. The videos are now available on CD through

Kappa Mu Epsilon, ULM's mathematics honor club for minimal cost. We can fit all of the videos (homework problems included) on 3 CD's for a student's cost of \$3.00 per CD. These are not write-protected, so oftentimes the students just share the disks, making them even more economical. Through the high demand for the CD's and from anecdotal evidence from our own students, as well as others throughout the country who have "stumbled" onto the site searching for help with a specific algebra topic, the project team feels confident that the videos are a creative and innovative answer to a very common problem: a one-time explanation in class just isn't enough.

Low achieving students can be found at every level of every university. Creating a web-based video environment that these students can easily access from any computer not only helps the students feel less anxious about mathematics; it helps the overall teaching environment. Additionally, the videos also allow the students to witness another teacher's explanation of the topic. This often creates a greater understanding of mathematics. Perhaps the nicest thing about the site is that it allows students to access video solutions to homework problems; problems that never seem to be addressed in class due to time constraints or student's fear of asking for "easy" problems to be worked. Students email requests for specific problems to be put up, and we produce the video and put it up on the web, generally, in less than 48 hours, oftentimes within a few hours (because many are still produced in one instructor's kitchen at all hours of the day or night). So far, about half of the text's homework problems are available, but only those that have been requested have been put up.

The university has embraced the idea of the course related web-based videos. Course reductions are offered to any instructor who is interested in creating and producing videos for other courses. Math educators are also interested in how the videos are created and distributed. A presentation has been made at Louisiana Association of Computer Using Educators (LACUE) 2001, in Alexandria, LA and one will be made at this year's ICTCM conference. A workshop was given at the 2002 Northeast Louisiana Technology Fair and will be presented at the LATM (Louisiana Association of Teachers of Mathematics) conference in Baton Rouge, LA in November 2002. A workshop is also currently under review by NCTM's (National Council of Teachers of Mathematics) national conference in 2003.

The course related videos are a simple and inexpensive, yet elegant and technological answer to an age-old problem. Any instructor with a 400mhz Windows ME or better computer, a webcam, a chalkboard, server space, and a room as small as 10 feet by 10 feet can easily replicate this project. To see examples of the videos visit: [www.ulm.edu/~esmith/math093/math093.htm](http://www.ulm.edu/~esmith/math093/math093.htm). Note that the site is set up to correlate with our text specifically. It is assumed that the user is using their copy of the text to navigate the website. Try visiting Unit 4, then section 4.9. You can view the example and practice problems, which are presented in the class lectures. Any homework problems (drill sets) that are not available on this site have not yet been requested by the students. The project members are excited about sharing the ease at which technology has helped our university meet our student's needs.