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Jeffrey Barlow
Pacific University

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The Berglund Center TransPacific International Classroom Project as an Example of Research & Development

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By Jeffrey Barlow <barlowj@pacificu.edu>
Editor, Interface

Introduction

In this editorial we use, as an example of the importance of research and development funding (R&D), a project in which we are currently engaged at the Berglund Center for Internet Studies at Pacific University. [1] We compare our experience within American and Chinese institutions while engaged in a common project.

Summary of Project

The Berglund Center for Internet Studies at Pacific University received a proof-of-concept grant in the amount of ten thousand dollars from the Northwest Academic Computing Consortium (NWACC) to establish Internet Protocol-based interactive classrooms shared with Wenzhou Medical College (WMC), Wenzhou, China. The grant is paying the costs of presenting two classes in the fall and spring semesters of 2004-05. By Internet Protocol or “IP” we mean that we are using the World Wide Web as the means of transmission of digital information. There are many other means of transmission, but most of them are both complex and expensive, often requiring special equipment, multiple phone lines, and/or dedicated servers.

Our goal was to use off-the shelf technology within an Internet environment, bringing this means of transmission within the reach of most American K-12 school districts and nearly all colleges and universities. We are testing the feasibility of sharing classes in real-time between two very different and widely separated educational institutions with this readily available technology.
Current State of the Project

The first class, begun in mid-September, is a course in American Literature taught by Dr. Tim Thompson of the Department of English at Pacific University. This topic naturally is a challenging one involving as it does two markedly different cultures. Dr. Thompson, a Berglund Fellow for 2004-05, will report on his part of the project in a subsequent issue of Interface.

Technological issues [2]

We began assessing potential applications and technologies in June. After much work we achieved, as of early October, a combination of technologies and applications which now permit a fully IP based delivery of course materials.

Prior to that time, we had been relying upon a combination of synchronous (that is, in real time) and asynchronous (meaning accessed at any time within a static environment such as from a CD or DVD) modes of delivery. Over the summer we videotaped and burned to CD many hours of lectures and discussions for the course (Dr. Thompson taught the same materials to a small group of Chinese students from Taiwan on our campus as part of another program). These were mailed to WMC as backups to get us through interruptions caused by technological inadequacies or power failures.

In fact, these back-up materials have rarely been used; within one week of beginning the program in early September we were delivering good content via the Internet, though we still experienced frequent frustrating interruptions.

The major issue, of course, was bandwidth. Either end of the “pipe” can experience problems that slow down the transmission of content in both directions, though it is the end experiencing the bottleneck that has the more serious effects. We solved the problem at Pacific by utilizing our packet shaper more aggressively to reserve bandwidth for this usage. This meant that our transmissions traveled very smoothly into China, but we received poor transmissions in return.

The Chinese end, lacking packet-shaping technology, first experimented with time windows until we jointly determined that any classes conducted after 9 a.m. their time (4 p.m. previous day PDST) would usually have periods of extremely frustrating interruptions as Chinese users came on line, clogging the pipe, and audio or video packets (a carrier of digital information) dropped out. We found that a packet loss of only about 1% effectively destroyed audio, but video simply updated more slowly.

The engineers at WMC then added a dedicated ADSL (similar to American DSL) line to the classroom. This was a great step forward as from the time this line was inaugurated, September 27th, PST, we experienced reduced frustrations and our delivery of materials continuously improved.

The initial signs of success caused the Chinese leadership to devote substantial funds to the
project. It should be noted that WMC moves very quickly; by the time they saw that they needed ADSL they had a line up and running within 48 hours. They then saw that the English program needed a dedicated computer lab with adequate stations for 60 students, and they built one within two weeks.

The real breakthrough in delivery, however, came when the engineer at WMC persuaded us to break out the audio signal via an audio application called SKYPE [3], and leave the video signal on I-Visit [4], the application we had initially decided to test. Running SKYPE audio over their regular Internet connection and I-Visit video over their ADSL line, the WMC end now usually achieves both excellent video and audio. The SKYPE audio is clearer than a land line or cell phone call, and is a totally pure sound, free of line noises or hiss.

We continue to work on upgrading the video signals because when we experience drops in bandwidth, the video updates too slowly at our end for the instructor to get a continuous real-time view of the Chinese class, though that class usually has such a view of the American instructor. At present we are testing Microsoft Netmeeting [5] for the video transmission and it is working well, though we are not certain that we cannot yet do better. We have hoped that our applications would all be cross-platform as many American educational institutions are primarily Apple platforms, though Apple platforms are rarely encountered in China. [6]

The Next Stage of the Project

We have already achieved proof-of-concept in that we are teaching a more or less “ordinary” class between Pacific University and Wenzhou Medical College using off-the-shelf equipment and applications.

We will be spending about one month in China from December 18 or so to late January and will gain a much closer understanding of events at the Chinese end, which we will report upon in our February posting of Interface. This trip is paid for by WMC, which shows the importance of the project as viewed by their administration.

We will begin our second class in early February, and expect that it will test our pedagogical understanding more than our technical preparations. In fact, the technical side has proceeded with unexpected rapidity because of the willingness of both the American and Chinese institution to commit additional resources to the project. We are well ahead of where we expected to be at this time.

Implications for Research and Development

At Pacific University we have been planning a project such as this for more than four years. There has been an advantage of sorts in waiting as the technology has developed apace, making the project easier, but we would have preferred to start some time ago. The problem, of course, was funding.
We required start-up funding of more than the ten thousand dollars that we received through the generous contribution of NWACC. Many of our costs are, in fact, matches for the grant, making our total costs approach twenty thousand dollars. For an institution of our size, this sort of highly speculative activity was a risky one. We had sufficient experience in both China and in the Berglund Center to persuade us to take that risk, once we had received the seed money from NWACC. But lacking that grant, this project would never have begun.

As we compare the Chinese and American end of the project, we see a surprising contrast. [7] The Chinese consider ours a demonstration project of at least regional importance. Wenzhou Medical College has been very aggressive about protecting the project from bureaucratic interference at their end and has devoted considerable resources to it, including a dedicated ADSL line, the time of several teachers and an engineer, as well as constructing a new computer lab solely for the use of the students engaged in this project. From their perspective, the project is potentially a transformational one, providing their students with English classes taught by American teachers in real time.

But at the American end we had a great deal of difficulty in securing funding, delaying our project by several years. Each obstacle to be overcome requires careful planning and no small amount of luck, too. Very few geographic areas have available to them an institution like NWACC, which grew out of an early academic consortium of Northwest schools which invested funds from joint enterprise activities into a generous grant program. We have had repeated calls from other institutions asking us how we could possibly fund this effort.

Also, we are fortunate that we have the support of a farsighted administration both at the institutional level and in our Instructional Technologies department, where Director Lee Colaw has been very helpful, allocating electronic resources as needed.

Above all, we have the resources of the Berglund Center for Internet Studies with its substantial endowment. We have been able to draw upon the resources of very talented students who, in essence, trained with us.

NWACC and Pacific University feels that this is a potentially important project. In the last several years, Chinese students have increasingly opted to attend graduate school in Canada, England, and Australia because the United States is not only far more expensive, but due to the changes following the tightening of entry into the country following 9/11, it seems to them to be increasingly inhospitable. IP-based delivery of university level courses has the potential to open an entirely new market for American institutions. But only a combination of fortuitous circumstances made our demonstration project possible. There were no federal or corporate funds for such activities, insofar as we are aware.

Other nations are channeling relatively greater resources into the development of digital technologies (as well as into education itself) than is the United States. Taiwan, to take another Asian example, is currently working to create a Wireless Local Area Network (WLAN) in the
capital city, Taipei, and then within five years spread the network throughout the entire island, which is about one-third the size of California. The Taiwanese government sponsors this project in the belief that this unprecedented degree of connectivity will both spur local research and development as well as attract foreign capital and new research centers. [8] Other foreign governments are undertaking equivalent projects.

If China continues to invest at the rate that we have experienced in this project, and the United States continues to reduce funding or to channel funding largely into security-related technologies, the future seems to us to be a rather bleak one, for the United States at least. This is a complete reversal of my feelings when I first entered China in 1978.

Footnotes

[1] For the project website please go to:
http://bcis.pacificu.edu/nwacc/index.php

[2] For a blog site with frequently updated reports please go to:
http://bcis.pacificu.edu/nwacc/tipic.php
This is rather technical material but gives a good flavor of the progress of the project.

[3] For Skype go to:
http://www.skype.com/

[4] For I-Visit go to:
http://www.ivisit.com/index.html

[5] For Netmeeting go to:
http://www.microsoft.com/windows/netmeeting/

[6] Apple corp. has generously donated equipment to us to test from China in December-January 2004-05.

[7] We previously reported from China at
and again at:
http://bcis.pacificu.edu/journal/2004/01/edit.php
For those unfamiliar with the computer/Internet scene in China, those two pieces would complement this editorial.
