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The Efficacy of Video-Linked High School Classrooms in Fayette County Public Schools

According to many of its promoters, the world of distance education has moved from humble beginning to paradigm shift, from niche technology to the future of education. In contrast, the trenches – public education and its practitioners – have really never left home, have continued with the classroom practice and school traditions of their parents. Hence the problems and failures their parents faced are still with us, all the more difficult for their age. The institutions that fund and support public educators are often caught gazing longingly at distance education and its technologies as possible weapons in these old battles. In our discussion, we will examine what role one of those technologies, fully interactive videoconferencing (the “video-linked classroom”), might play in this fight, especially in one battle – the battle over equitable access to classes in the public high school.

A Brief History

In comparison to the lineage of many educational technologies, compressed video is not, by any stretch, the most current. The first two-way interactive video-linked classrooms began to appear in the 1980’s, but because of costs, the early educational experiments were primarily in post-secondary settings such as universities and community colleges, often with non-traditional students (English 1988). Barker et. al.

(1989) found a few high school examples, the harbinger of an explosion of well-funded state initiatives in the 1990's, many of which (including KTLN, the Kentucky Tele-Linking Network), were aimed in part at supporting primary and secondary instruction. The use of this capability in higher education is still quite active (for a look at community colleges, see Dillon and Cintron 1997), but, overall, in the pursuit of K-12 learning at a distance, compressed video technology has lost its sex appeal, having become buried in an avalanche of asynchronous instruction initiatives pushed by a love affair with the World Wide Web (see Rucker 1998; Thomas 2001).

As a result, faced with the end of grant funding and other austerities, KTLN has shrunk from hundreds to a dozen or so active network nodes. The numbers of student/hours of educational experience they provide has slowed to a trickle, and the offerings that remain are a long way from being uncontroversial in instructional usefulness. Although KTLN enjoyed a smattering of research in 1995 soon after its introduction, it has pretty much disappeared off of the research landscape (only two entries appeared in an ERIC search on 10 November, 2002: Sagan and et al. 1995; Hinton and Oleka 1996).

Of course, this drop in attention and usefulness has not been offset by increases in other alternative instructional delivery systems. Our love affair with the Web has, so far, failed to make serious inroads into the world of public secondary education (see Thomas 2000). Issues of access, cost, student motivation, and course quality have caused most asynchronous distance learning experiments to languish on the sidelines, serving, despite massive amounts of development money and high visibility, painfully small student populations in small pockets of acceptance. As an example, in Fayette County, the

number of students served during the entire history of the Kentucky Virtual High School, the state run and financed asynchronous instructional initiative, can be counted on one hand.

The Need

Although the overall utilization of the KVHS initiative remains quite small, a few districts have discovered that this resource can serve to shore up a certain gap in high school offerings – a lack of Advanced Placement (AP) or elective classes due to low potential enrollment and/or a lack of trained teachers. It would seem that Fayette County Public Schools, as the third largest district in the state, would not have such problems, but it does. For the 2001-02 school year, 71 students took AP exams at Bryan Station High School – a good indication of how many students were enrolled in such classes that school year. The next lowest high school was Tates Creek, at 222 AP exams taken – more than three times as many. Clearly Fayette County is large enough to have gaps within itself. This gap – an inequity of access to quality elective, advanced, and Advanced Placement (AP) classes across high schools – is what stimulates the examination of alternative course delivery technologies.

This seemingly minor disparity contributes to major ones. Educational researchers have had no problem establishing a statistical performance gap between students of varying races, ethnic backgrounds, socioeconomic status, and physical location (Lee 2002). There is, of course, no agreement on how best to address these statistics, and the students they represent. The overwhelming majority of public school districts have determined that it is the masses of students at the bottom of the achievement gap that

need the added attention and encouragement, and a moral argument could certainly be made for that approach, regardless of the statistics. However, an examination of strata amongst the numbers shows that the gap is widest at the top – the percentage of minorities and disadvantaged students appearing in and successfully negotiating advanced and AP classes is far greater than any such gap in less demanding courses (for an examination of this in North Carolina, see Darity, Castellino et al. 2001).

The reasons are varied and difficult to address: low outside support, few successful peer examples, no inside-school social support structure, to name a few. The most basic and glaring is a simple lack of such course offerings on many high school campuses due to a combination of low enrollment and high staffing pressures. An interest in addressing this inequity is by no means a *non sequitur* - Guilford County Public Schools (Greensboro, North Carolina), after discovering that many minorities who qualified weren't taking the classes, doubled AP class participation in two years through a combination of increase course access and student incentives (Grier 2002).

The problem of low numbers of course offerings can be addressed by asynchronous distance learning solutions, but supporting all of the other problems of the achievement gap with virtual tools has only the barest of research bases. At the worst, web-delivered instruction may provide an environment where the material is almost exclusively text-based, where a sympathetic instructor is all but invisible, and where the association with other, successful students is completely abstracted (Campbell and Storo 1996). Suddenly, the not-so-sexy interactive video-linked classroom has a lot of potential to offer. To sweeten the pot, a combination of improved underlying technology

infrastructure, and a dramatic increase in the quality of the hardware, have increased the attractiveness of this medium.

Video-Linking: Current Practice

Traditionally, advanced technologies such as compressed video have been too expensive to allow its implementation at the district level, hence most such initiatives have had state funding with general goals and objectives. An exception is South Dakota (2002b) where a large number of full-quality-capable nodes in a state-coordinated video conferencing network are used to deliver traditional middle and high school courses at coordinated times, with remote sites responsible for student supervision and providing textbooks and materials. Although the network is used for other purposes as well, this seems to be one of the few examples of ordinary K-12 classroom linking – in this case implemented on a massive scale.

For many states, classes utilizing state-financed compressed video networks are taught by university or community college instructors to non-traditional students, occasionally including high school students wishing to get a head start on college (see Spears and Tatro 1997; Carter 1998; Shaheen 1998). However, the vast majority of such networks do not seem to provide many regular K-12 classes. The Iowa Communications Network (2002), a fiber-optics-based network of compressed-video classrooms, connects libraries, civic centers, community colleges, and schools. The system primarily provides one, or a series of two or three, video-linked educational experiences, with scheduling managed by Iowa Public Television. Kentucky's own KTLN is connected to a few content deliverers such as the Kentucky Educational Television studios, or Louisville's

Living Arts and Sciences Center, and besides a handful of programs offered by them and the schools themselves, the KTLN nodes are used occasionally for ISDN connections to content providers out of state.

The result of many of these state-funded initiatives (especially Kentucky) is a fabulously expensive medium for “virtual field trips” made available to a very small percentage of schools and students— those who are lucky enough to attend a school with a working node in the video-linked network. Content suppliers remain in short supply and are often quite expensive, with connectivity adding costs as well. Often the scheduling of these opportunities has been placed in the hands of a small number of node managers with no broad curricular objectives beyond their own classroom needs or interests. To make matters, worse, there is a complete lack of research on the effectiveness of such educational experiences (for a general review of the instructional usefulness of telecommunications projects in the classroom, see Fabos and Young 1999). In contrast, video-linked classroom sharing initiatives at the post-secondary level have a more rigorously examined history, and will provide us with our only fleshed-out view of this capability (see below).

The Home Field

Fayette County Public Schools began its Fayette County Video-Linked Classroom initiative in the fall of 1999, with a single student of Russian telecommuting from his Bryan Station High School campus to his teacher at Henry Clay High School, 3 miles away. The concept was quite simple – use interactive compressed video equipment to establish a presence in an on-going, traditional classroom, for students in remote

locations. Of course, this first example was an odd one, since it would have been a great deal cheaper to simply pay to transport the instructor, since she had no students during this time slot at her home school.

Since then, a total of three other classes have all been offered this way, two of them during the 2002-03 school year. A total of 9 students will have been served by the end of this year, all of who will have successfully completed their course of study through the initiative with flying colors. None of these students could have been served in any other way – KVHS does not offer the classes these students took or are taking, and KTLN is simply not structured to handle this need.

The program has shown great promise, but has failed to win the support of administrators, scheduling counselors, and district administration – hence the painfully small enrollment numbers. With an overall investment of about \$40,000 in hardware and another \$10,000 in personnel costs, the program can hardly be called a whopping success, and to add insult to injury, only one minority student has been served thus far.

The Technology - Hardware

The use of video conferencing to link simple point-to-point classrooms within a district through IP network connections sidesteps a lot of the problems associated with ISDN and satellite systems. This flexibility, in combination with many recent advances in the technology of compressed video hardware, has meant that a great deal of the complaints of past researchers on video-linked classrooms (see Reed and Woodruff 1995) have been muted, or at least addressed. The following has been gleaned from direct experience with the technology in the past six months.

- **Audio delay** – this problem with older systems is largely non-existent in a point-to-point system within a single district, where distances are not great, and bandwidth is adequate.
- **Unwieldy controls** – the controls of the new equipment are nearly identical to those of a simple TV/VCR remote control, and automated controls such as voice-priority, image following, and auto volume, work a great deal better.
- **Awkward turn-taking** – this bugaboo of older systems, exacerbated by the problem of four or more connections, largely disappears with point-to-point, full-duplex (two-way) sound video conferencing solutions with current technologies, where the television-delivered remote image is constant, and the automated full-duplex sound allows easy break-in and discussion.
- **Size and mobility** – “always on” and instant-access connectivity, provided through the existing computer network infrastructure of schools and districts, mean that any classroom in a school has the required connection point to deliver or receive a video-linked class. In addition, the current hardware for full-featured video conferencing is no larger than the size of an ordinary videocassette recorder, even when that hardware includes a fully functional computer for digital access and display. The need for a dedicated space for this capability disappears, and any classroom with a television becomes a telecommunications site.

Clearly, the technology has come of age. There are, of course, bandwidth requirements for the streaming of this much data over an IP network, but these costs are quite minor when balanced against the cost of providing these courses, and the additional instructor required to teach them, on sites where enrollments are low.

The Technology - Instructional Practice and Student Participation

Research on the use of two-way interactive video in instruction has been positive almost from the onset, with early participants rating such courses higher than conventional classes (McCleary and Egan 1989). Hilgenberg and Tolone (2000) found that students at remote sites generally are motivated, do well, and respond quite positively to instruction delivered this way. This is, of course, in no small part due to the self-selection of such students, for whom, in many cases, such courses would otherwise simply be unavailable. Martin and Bramble (1996), evaluating a redesign of existing short courses for delivery through this medium, found that the perception of opportunities for interactivity was quite positive. Even interactivity between students was viewed well, only rated negatively when remote-site facilitators had an adverse affect on student access. However, the data is still meaningful since, for secondary schools, there is little reason to examine such capabilities for any other reason.

However, the use of compressed video for instructional delivery cannot be assumed to be the same as face-to-face instruction. There is a consensus amongst scholars that any mediation of instruction through technology changes that instruction, and hence classroom practice should change to reflect this. Fulford and Zhang (1993) found, in a study of in-service elementary teacher participants in three two-way interactive video classes, that the perception of interaction was pivotal to course satisfaction - a result shared by Shrestha and Sutphin (2000). Squire and Johnson (2000) found that effective instruction in this medium required that teachers act "...as facilitators rather than content providers" (p. 39). The issue of interactivity is especially pivotal when four or more

classes are linked through interactive compressed video, since turn-taking in this setting is substantially mediated by the technology (Kelsey 2000). In addition, Kelsey (2000) found that, in such settings, technology failures were second to social concerns in preventing interactivity, stimulated by the appearance of formality often present in video-linked classes. Students feared "...appearing 'stupid' in front of peers and professors...[and were concerned that] questions ...should be important to everyone." (p. 69). Stout (1995) noted that problems with interaction placed the need for alternative channels of interaction to be established to supplement the video-linked classroom.

But in its current practice in Fayette County (with only two connected sites, increased quality of hardware, and flexibility of installations), much of the mediating effects of the technology can be easily sidestepped. Of the many technology-delivered instructional environments, compressed fully-interactive video provides substantially lower mediating affect than others - most significantly, than asynchronous Web delivery of instruction.

So, what are we waiting for?

In contrast to higher education and private-sector settings, all non-traditional instructional delivery methods remain an estranged distant cousin to the classrooms of public secondary schools, where face-to-face instruction is not so much an interest or habit as a philosophy of life. Add to that the political difficulties inherent in ceding delivery of advanced courses - courses most popular with teachers - to off-site instructors, and it is not terribly hard to see why any alternative instructional delivery methods (including video-linked classroom initiatives) are discounted or ignored. High

schools are often self-contained political entities that openly compete with others, and are suspicious of input from outside.

At the state policy level, the Kentucky Virtual High School (KVHS) is currently the method of choice in addressing inequities of course access. But, as indicated, the popularity of this capability has yet to establish a consistent presence in most districts, and is completely absent from Fayette County. In the meantime, KTLN has lost direct fiscal support - equipment upgrades and remote connection costs are now borne by the districts in which the nodes exist.

And in this sea of unfulfilled promise, neglected capability, political infighting, and lack of vision, swims the student, whose access and course selection options will, without outside intervention, depend on the school into which his neighborhood feeds.

Conclusions

There are no silver bullets. If Fayette County, and other public school districts like it, woke up tomorrow and discovered full funding and full agreement over a video-linked classroom initiative, the issues of inequitable access and low achievement in advanced high school classes, and the overall achievement gap they exacerbate, would not be swept away in one grand gesture. However, it does not require much effort to note that if a successful student arrives in his/her senior year, and her ability to continue with an established course sequence or participation in an AP class will be determined which high school she attends, that this will affect the gap between the schools and the populations they serve. In many cases (certainly in the case of Fayette County), this gap will be matched by a parallel difference in enrollment demographics. As we have seen,

there *are* capable students who do not enroll in classes for which they are qualified. It is in difficult circumstances that distance education technology can be used as one of the weapons in this battle over student achievement.

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